the OIL AND GAS JOURNAL

FEBRUARY 10, 1958

## How Shell Builds Better Managers

*Check list spots weaknesses.* p. 70

## 13⅜-In. Casing Set to 7,898 Ft.

*. . . in 24,000-ft. Oklahoma test.* p. 74

## Dual-Purpose Pipeline

. . . it stores
. . . it transports
high-purity ethylene

p. 100

Two ways to
BETTER
OIL
RECOVERY

p. 117

## why it pays to
## specify ROCKWELL-Nordstrom VALVES on
# OFF-THE-DOCK CHRISTMAS TREES

Just because a tree is a prefabricated "stock tree" there's no reason why it can't have the very best valves. Especially since you pay no more, often less, for Rockwell-Nordstrom lubricated plug valves. Here's why it will pay you to always specify them on your off-the-dock Christmas Trees:

**PRESSURIZED LUBRICANT SEALING** insures positive shut-off.

**UNEXPOSED SEATS** can't be cut or wire-drawn.

**QUARTER-TURN CLOSURE** is fast, smooth and easy.

**INSTANT OPERATION** with "hydraulically seated" tapered plug.

Rockwell-Nordstrom Christmas Tree valves are available at leading supply stores everywhere in a complete range of sizes and pressures. See your supplier soon; he'll tell you more about why it pays to specify Rockwell-Nordstrom valves. Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom VALVES

*it's* **ROCKWELL**

MANUFACTURING COMPANY

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 10, 1958

The oil industry is facing up to some bitter medicine:

Price structure is being threatened.
That's true both for crude and products.
Nearly everyone knows the reason: Oversupply, failure of demand to live up to expectations.
Not everyone wants to face the cure: Drastic cuts in refinery runs and supply of crude.

Steps have been taken to reduce supplies.
Production is down for the week. So are crude stocks. Refinery runs have been cut some along with product stocks. In a normal year these would be sufficient—but they're not drastic enough for present conditions (p. 203).
Long range statistics show why: In 6 years the four-product stock total has moved up 49.3 per cent. Total demand for these products has gained only 17.1 per cent.

Result naturally is softening of prices.
Prices of fuel oil, kerosine, diesel are down again. This is not uncommon at this time of year. But softening gasoline prices as motorist season approaches are dangerous.
Erosion of crude prices has gone so far the main price structure is threatened. Latest move was a price cut for West Texas sour crude by Eastern States (p. 65).

Crude price cuts wouldn't help very much.
Refiners would get only a brief gain. Lower product prices would surely follow. Margins then would be same as now.
Producers would be hurt. Result would be pressure from them to increase production to regain lost gross income. This clamor could lead to a worse oversupply picture.

Vast program of selling liquefied natural gas is being studied by Constock (Continental Oil and Chicago Stockyards).
When initial experiment is completed, Constock will build liquefaction plants in many areas where cheap gas is handy. The liquid gas then will be moved by ship to areas of world where reasonably priced energy fuels are scarce.
Constock may do job itself or handle it through affiliated companies.

OCAW union leaders are showing increasing concern over layoffs in the oil industry.

Union Boss Knight says minimum labor position on this issue will be: Substantial notification prior to layoffs. Chance for labor leaders to sit down with management and negotiate alternatives to layoffs.

Humble has a new approach to problem of layoffs.

It's an improved early retirement program.

Such a voluntary early retirement program has been adopted for veteran Humble employes with a two-fold purpose in mind:

Help alleviate surplus personnel brought about by current business trends and to meet requests by long-service employes for early retirement.

The plan: Eligible employes may retire at 55 or over. Company will make special allowances to replace part of the benefits lost by early retirement.

Base Metals Mining Corp. is holding on to its interests in Jamaica.

It is taking back full interest in 46 licenses covering the entire island when Pan Jamaican Oil Co. decided to pull out after spending more than $3.3 million on three deep tests.

Base Metals claims its decision is prompted by geological reports that the three wells do not condemn the island and that prospects for an oil basin there are still good.

Indiana Standard is moving into the Eastern Hemisphere in its search for new reserves.

A new subsidiary, Pan American International, headed by C. F. Dohm, reportedly is negotiating with Kuwait for an offshore concession. It also is looking closely at Africa and Iran.

The move emphasizes a trend in Indiana Standard operations. Only recently the big company returned to Latin America. Once a large investor abroad, Indiana Standard turned its back on foreign areas in the early 1930's to concentrate on domestic production.

The Las Animas arch is ready to move into the exploration spotlight.

Geologists believe the mighty uplift stretching across eastern Colorado, northwestern Kansas, and southern Nebraska may hide as many oil and gas fields as the Central Kansas uplift.

Wildcats now have found oil and gas at the northern and southern ends of the arch.

These flank successes may open new wildcat campaigns along its 250-mile crest between now and 1956 (p. 177).

A new entry in offshore drilling can put its economic

approach to gulf operations to an immediate test.

Trans-Gulf Offshore Drilling has commissioned its first drilling platform. It was started before current slump but was designed for highly competitive work.

With 35 offshore rigs idle on the gulf, the time has arrived for real competitive bidding.

Trans-Gulf is counting on the compact and economical design of its new unit, which represents a considerably lower investment, to help it compete with the old-timers.

Oil men with a stake in deep drilling will want to follow operations at Howell & Howell's Anadarko Basin No. 1 in Caddo County, Oklahoma (p. 74).

The wildcat is aimed at 24,000 ft., a new depth record. It should provide a good laboratory for heavy drilling tools and deep-drilling techniques.

Operator already lays claim to two records: Longest 17½-in. hole ever drilled. Longest string of 13⅜-in. casing ever run.

Planning which went into gathering the equipment, drilling, running the casing, and cementing makes interesting reading for drilling people.

A sigificant experiment with air drilling has been conducted on the east front of the Rockies in northern Montana by Continental Oil.

Conoco tested air drilling against mud drilling primarily to achieve a straight hole and better penetration weight.

It found with air that penetration rates were higher, bit runs longer, and hole straighter. Costs also were lower. For example: The 10,050-ft. air-drilled well cost $295,000. A nearby well drilled to 9,392 ft. with conventional mud cost $390,000. Another to 12,920 ft. cost $550,000.

Among other results of the test is this: Air drilling can be done successfully through long intervals of open hole (p. 105).

Decision on proration yardstick to determine production allowables in Louisiana appears near.

New formula, replacing the depth-bracket system, now is expected to be based partly on reserves or acreage.

Three plans have been submitted to Conservation Chief John B. Hussey. They were worked out separately by Humble, Magnolia, and Atlantic Refining. Each has been applied experimentally to representative fields to test the effect on individual producers.

Refiners are finding new applications for stream analyzers and computers used as a team.

You'll recall that a fully automated polymerization unit was recently ordered by Texaco for its Port Arthur refinery.

Now Esso has taken the wraps off an automatic pilot-plant system planned for its research center.

Something coming to watch for: fully programed processing units of commercial size which will come down and start up automatically.

Interest in fuels suitable for missiles and satellites will be heightened by Explorer, America's orbiting satellite.

Outlook at the moment: RP-1, conventional rocket fuel teamed with the exotic fuels will be used for some time.

Later: Pure chemicals, probably naphthenic in composition, likely will take over.

The petroleum industry already is in the field. It will continue to participate because of its know-how in making synthetic chemicals in large volume.

Backers of a proposed 2,500-mile LPG pipeline from Houston to New York have been in Tulsa talking with potential shippers.

Preliminary study indicates a 10 or 12-in. line planned by New York Central and Katy railroads is feasible.

If shipper interest is high enough, the railroads plan to proceed with a complete engineering and cost study.

New ethylene pipeline between Lake Charles, La., and Orange, Tex., offers some unusual twists for pipeliners.

The line built by Petroleum Chemicals was designed for two purposes: Move high-purity ethylene and use as storage facilities when the need arises.

Interesting engineering problems resulted from the marshland construction, from drying the line, and from operating the system at varying pressures to permit storage use (p. 108).

Pipelining western Canadian crude to the Montreal refining market will penalize both the producer and consumer, says Imperial's President J. R. White.

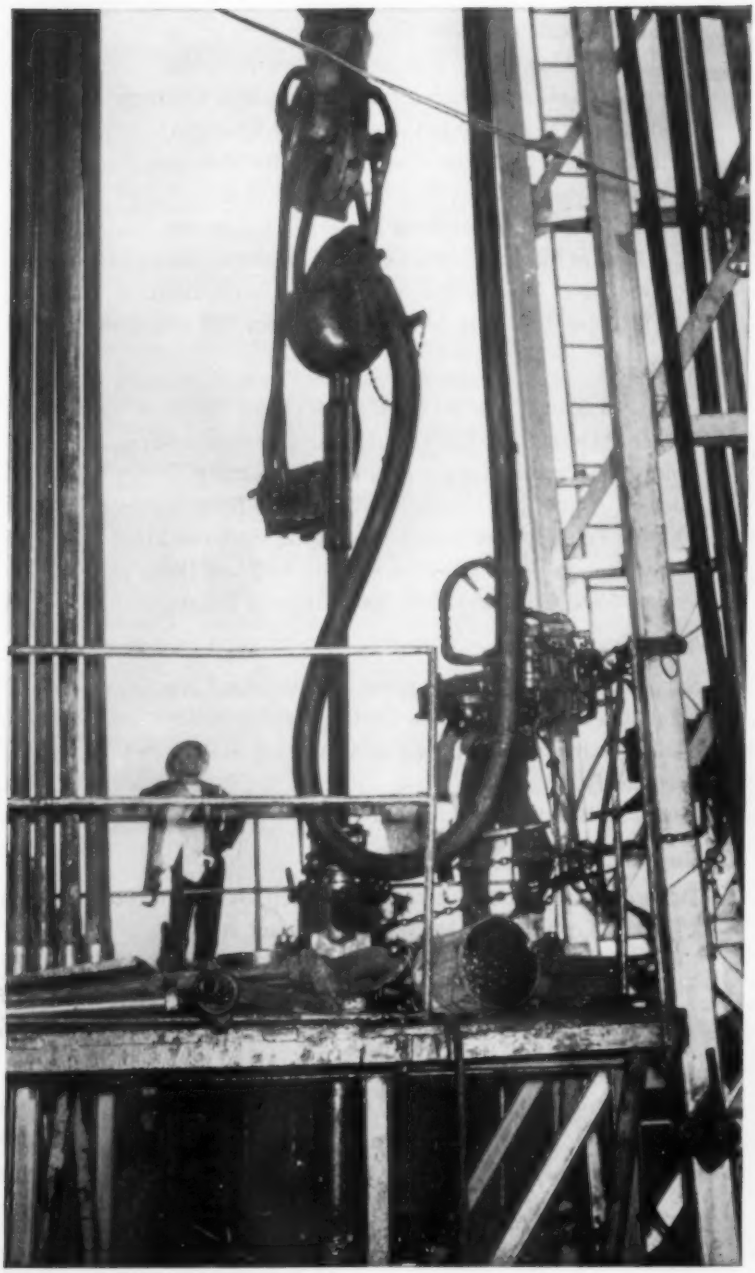
Commenting on Levy report (OGJ, Feb. 3, p. 49), White says Canada instead should pressure the U. S. into lifting its restrictions on natural markets between the two countries.

Danger of the Levy plan: Western Canadian producers in future should not be chained to a cut-rate Montreal price, White says. Foreign producers won't sit idly by and lose their Montreal market—they'll cut too. Under these conditions, who'll put up $300 million to finance a needed crude pipeline?

Washington notes: Gordon Guiberson of Dallas is slated to become new head of Interior's Oil and Gas Office...President Eisenhower has voiced support of depletion allowance for oil and gas—only as a spur to exploration.

B.F.Goodrich

# 20% saved when rubber hose replaces steel on workover rig



### *B. F. Goodrich improvements in rubber brought extra savings*

***Problem:*** This special aluminum portable drilling rig is used in servicing wells —cleaning them out, cutting plugs, removing lost iron or steel. Because of the rugged service, a steel rotary hose was used at first. But it was built in sections. Expensive time was wasted in assembling the metal hose every time the rig was put into operation.

***What was done:*** The operators switched to B.F.Goodrich Highflex rotary drilling hose. Spiral wrapped cable wires make this hose resistant to bursts, qualify it for Grade C (5,000 lbs. test pressure) A.P.I. Hose ends are reinforced with additional plies of wire and fabric to protect against bending stress at couplings. Strong as it is, B.F.Goodrich Highflex is still the most flexible hose made for heavy-duty service. It's easy to attach to the rig, hangs well from the standpipe, coils easily without kinking.

***Savings:*** With B.F.Goodrich hose, operators estimate they save 20% in time and labor each time they put the hose into operation.

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**B.F.Goodrich industrial products**

the OIL AND GAS JOURNAL

FEBRUARY 10, 1958 • VOLUME 56 • NUMBER 6

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The Oil and Gas Journal, published Mondays, copyright 1958, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

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. . . an integrated magazine serving an integrated industry

# TECHNOLOGY—OPERATION

## Refining-Processing

Price Tags on Seven Methods of Removing $CO_2$ ..... 93

*By J. F. Mullowney*

Here is a comparison of the battery limits investment and operating costs for treating a gas stream containing about 34 per cent carbon dioxide down to 10-25 p.p.m. by different treating schemes. Such a gas stream would be found in a partial oxidation ammonia process or it might be encountered as a natural gas.

$CO_2$ Removal by the Hot Potassium Carbonate Process ..... 98

This new process employs a carbonate solution in range of 20 to 45 per cent concentration. The carbonate will absorb some 3 to 7 cu. ft. of carbon dioxide per gallon of solution. The process, in comparison with others, tends to conserve energy and plant investment is reduced.

Petroleum Coke Becomes Finished Product 115

*By L. E. Adee*

Continental Oil Co. is now producing calcined coke at the rate of 85,000 tons annually for industrial use. The Lake Charles, La., refinery operation marks one of the first times a petroleum refiner has calcined his coke to meet customer specifications.

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## Pipelining

Dual-Purpose Pipeline Handles Ethylene ..... 100

The new line, built by Petroleum Chemicals, Inc., from its Lake Charles, La., plant to contract customers near Orange, Tex., was designed for both transport and storage of high-purity ethylene. It will operate at varying pressures. The line had the usual headaches of Gulf Coast marshland construction.

On The Job . . . Pipelining ..... 131

To conserve heat loss in steam-carrying pipelines, Esso Standard Oil Co. recently bought $250,000 worth of pipeline insulation lined with mineral wool and weatherproofed with sheet aluminum. The company believes it's a good idea money-wise to protect pipes with an aluminum jacket.

## Drilling-Production

Why Those Low Lateral Readings ..... 88

*By Maurice Martin and K. S. Kunz*

Here is a tentative explanation of why some pay sands show abnormal readings. It is based on the fact that most shales are anisotropic and may often be more anisotropic than the sands—except those containing laminations.

Air Drilling Through Long Intervals of Open Hole ..... 105

*By R. E. Larson and Omar Peters*

Continental Oil Co. saved an estimated $100,000 on a test well using this technique. The test was located in the tough drilling area along the east front of the Rocky Mountains in northern Montana. This disturbed belt test proved highly successful.

Two Ways to Better Oil Recovery ..... 117

*By Dr. Charles D. Russell*

The gas-driven solvent-bank process and the enriched-gas injection process show great promise for secondary recovery. Both have been field tested and are potentially capable of recovering much more than 1 bbl. of oil per barrel of LPG. The solvent is recoverable.

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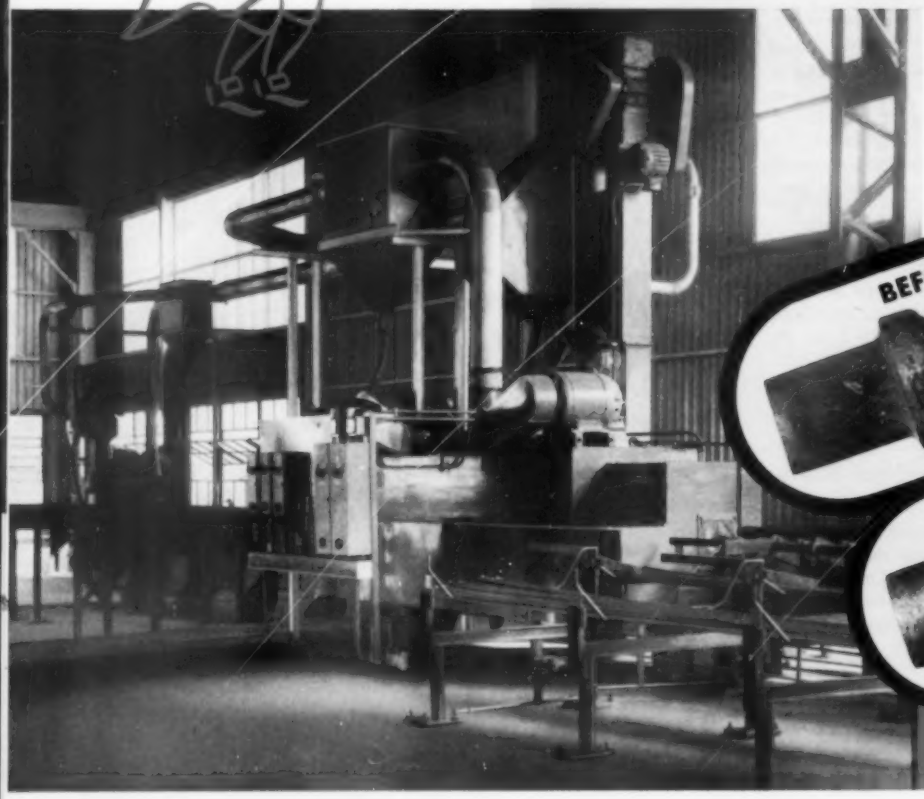
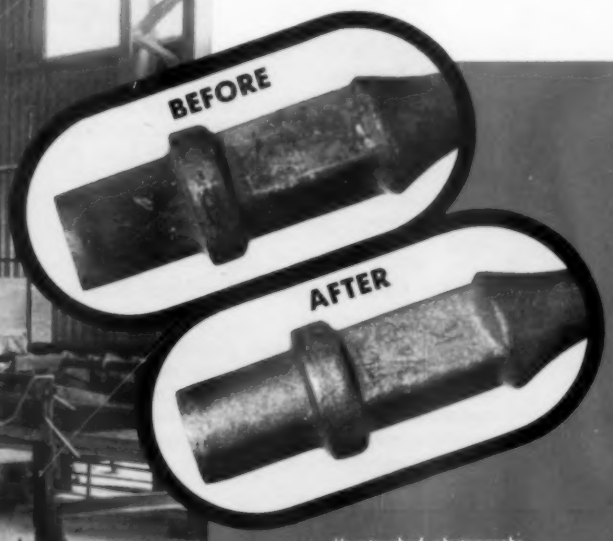
# SHOT BLASTING

## . . . CLEANS ROD BODY FOR BEST PROTECTIVE COVERING



The blunderbuss could get down to bare metal — but it lacked control. Control is a 100% must in Norris' shot blast process.




Unretouched photographs of rod ends before and after shot blasting

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In this latest model Wheelabrator machine, automated in controls, the scale caused by heat-treatment is removed by shot-blast, metal to metal abrasive, at high velocity. Inspection then is further aided, as any defects can be detected more readily.

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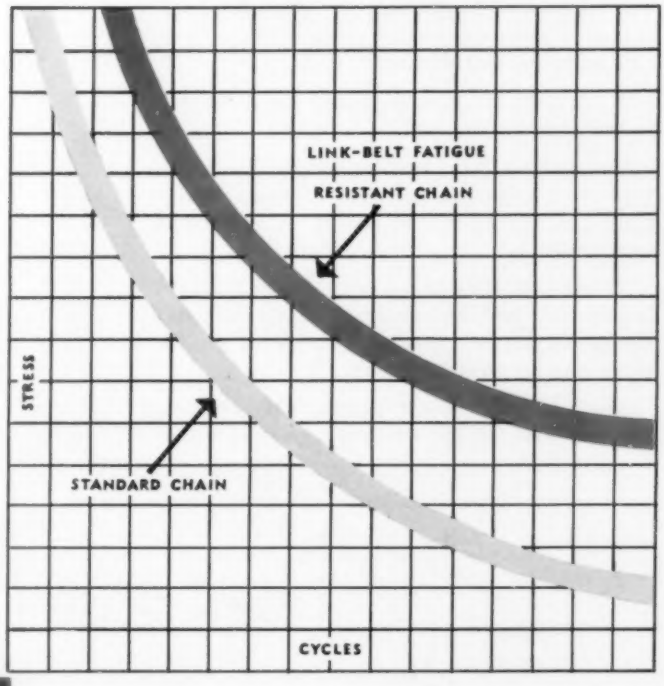
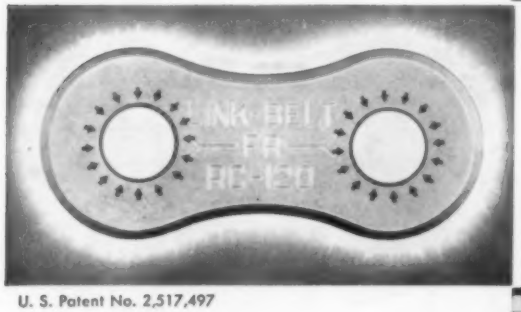
Standard on Link-Belt oil field roller chain, FR is supported by many more "extras." Any leading supply store in the field will gladly explain their importance, and furnish you a copy of Link-Belt Catalog 2780.



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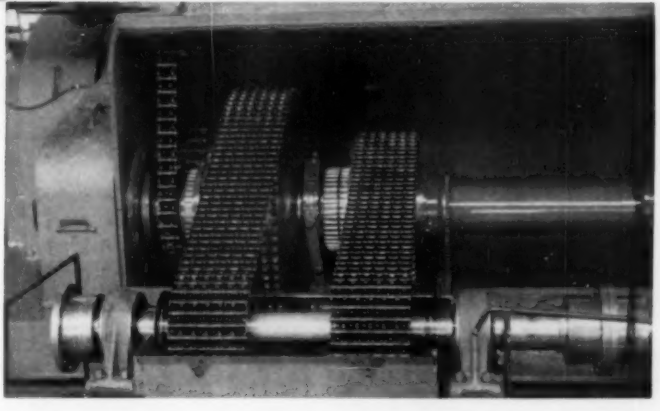

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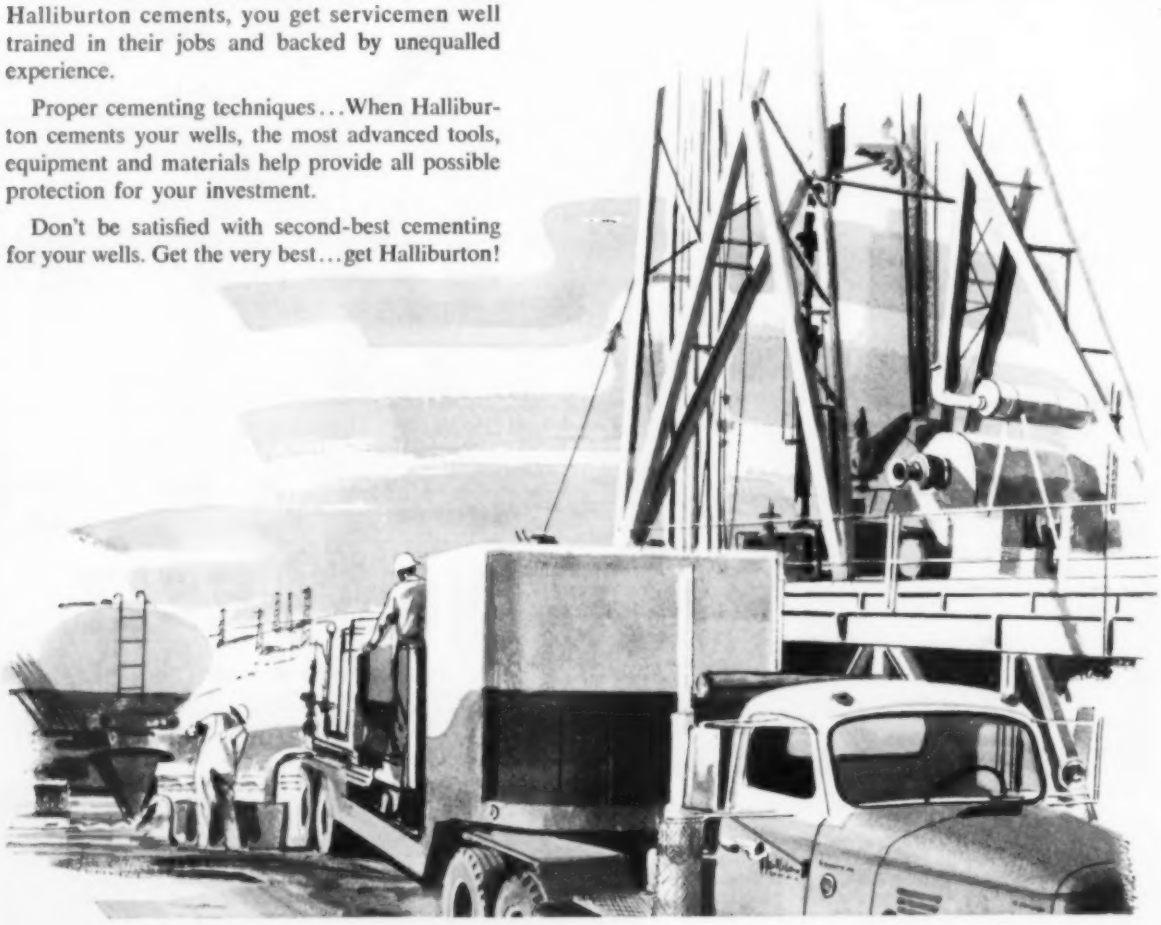

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OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

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(B) **HOWCOGEL**

(C) **DIACEL D**

(D) **HA-5**

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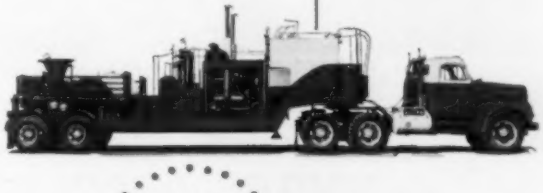
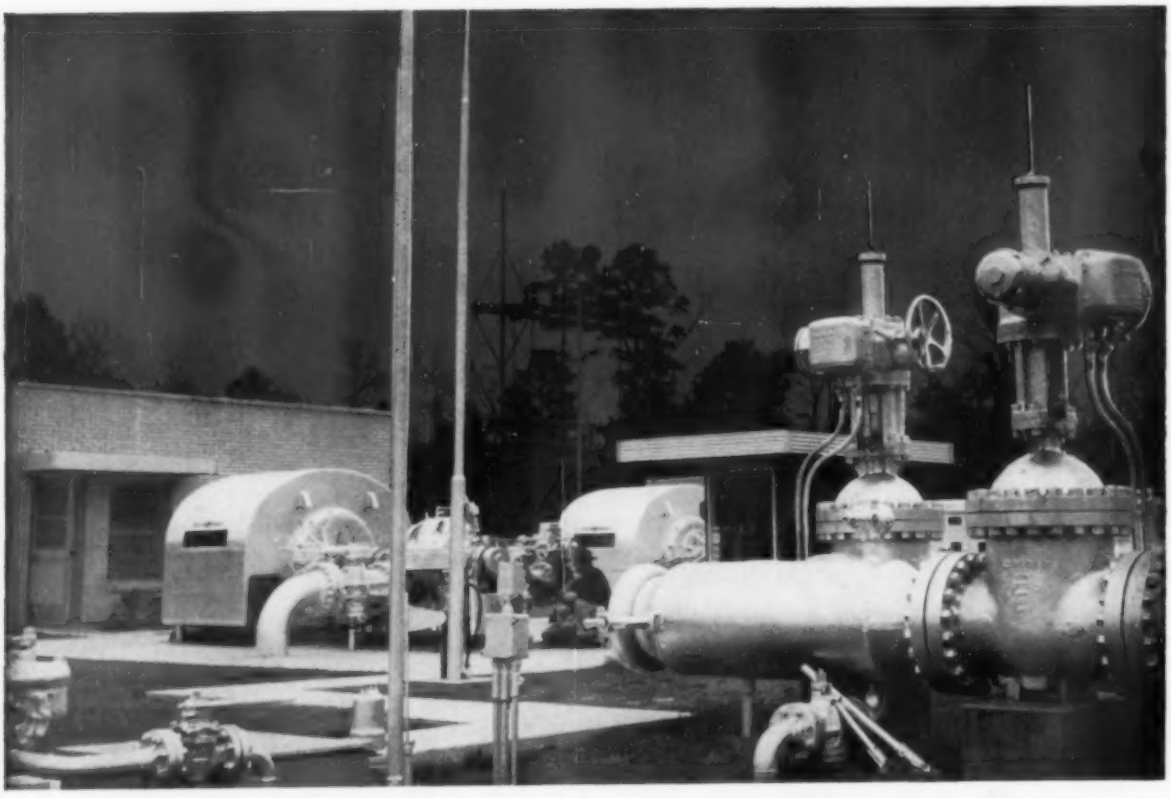
ANSWERS:
1 – (B)
2 – (D)
3 – (A)
4 – (C)



# CEMENTING SERVICES

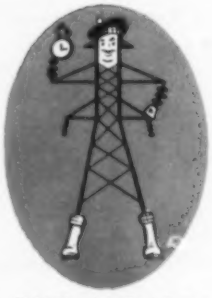
PACE SETTER IN OIL WELL CEMENTING!

# PIPE LINE PUMPING MAKES WONDERFUL CHANGE WITH ELECTRIC POWER



## Operated by Remote Control

There are over 686,000 miles of pipe line throughout America today – three times the total U.S. railroad trackage. Reason for this big boom is economy of transportation. Closely linked with the economy picture is UTILITY ELECTRIC POWER – the power that has made push-button, fully automatic pipe line operation possible. When you have deliveries to make on schedule – at low cost – without the usual worries of station down-time, etc. – USE UTILITY ELECTRIC POWER. It's the sure way to be modern, more progressive and make more money.



*I'M LCP – Low-Cost Power on the Job 24 Hours Daily*

**PETROLEUM ELECTRIC POWER ASSOCIATION**

P. O. BOX 35006 DALLAS, TEXAS

# ALUMINUM GATE VALVES

## BY DARLING

***FEATURING:***

**unmatched advantages of DARLING fully revolving double disc parallel seat gate valve principle!**

There's new economy to be gained in the handling of "problem" fluids and gases with Darling aluminum alloy gate valves . . . now available in ½″ through 24″ sizes. We have data on initial and long-range costs and performance that will interest you. Write for facts.

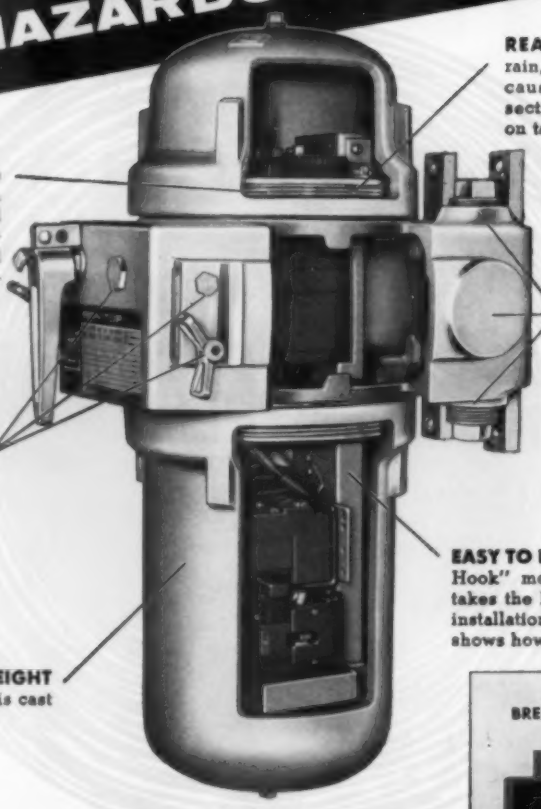
**DARLING VALVE & MANUFACTURING CO.**
Williamsport 1, Pa.

*Square D announces...*

# NEW SPIN TOP ENCLOSURE FOR HAZARDOUS LOCATIONS

**REAL PROTECTION** against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

**DAMAGE-RESISTING** Acme thread. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

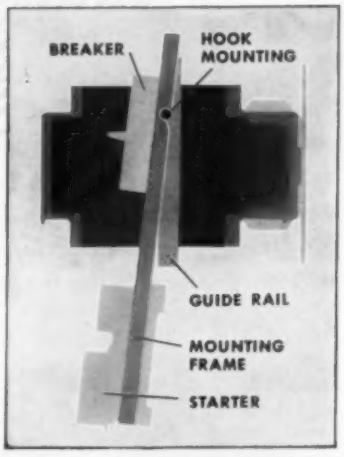


**INCREASED WIRING SPACE** and through-feed conduit entrances for horizontal tap-offs.

**EASY TO ADD** pushbuttons or selector switches with easy-to-buy, easy-to-use "off-the-shelf" parts kits.

**EASY TO INSTALL** • "Slide and Hook" mounting arrangement takes the hard work out of the installation job. Diagram below shows how.

**STRONG and LIGHTWEIGHT** The complete enclosure is cast aluminum.




**SLIDE and HOOK MOUNTING**

## 4 SIZES FOR STARTERS SIZE 0 THROUGH 5

**CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G**

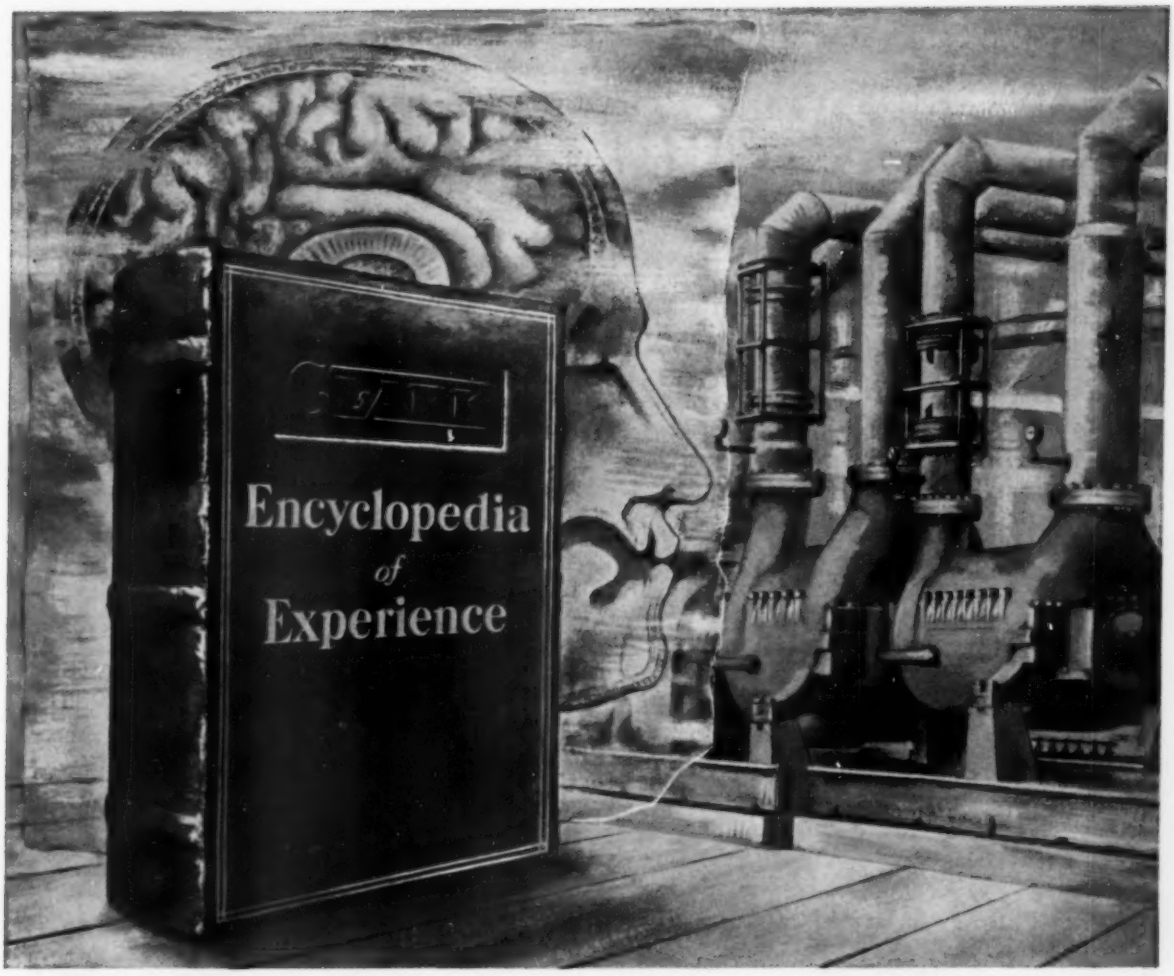
The new **SPIN TOP** enclosure is available from your Square D Distributor in three ways—complete device, enclosure only, or components only...for reversing and non-reversing across-the-line starters and combination starters. And for combination and non-combination two-speed starters.

*Write FOR BULLETIN 9990*

*Square D Company, 4041 North Richards St., Milwaukee 12, Wis.*

**EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE**

**SQUARE D COMPANY**




# Behind every Clark Compressor and Gas Turbine is an **ENCYCLOPEDIA OF EXPERIENCE**

The performance of a manufacturer's products over the years reflects the knowledge and skills of their builder. This compendium of engineering wisdom at Clark Bros. Co. can best be described as the Clark *encyclopedia of experience.*

The field performance of Clark's heavy duty compressors, and the engines and gas turbines which drive them, has earned for Clark the reputation of building "precision by the ton". Clark engineering, supported by the Clark *encyclopedia of experience,* is responsible for this performance and precision.

From Clark's vast experience, the needs of industry for ever better machines have been met. From it have come the many Clark contributions to the petroleum, chemical, and process industries.

It was the Clark *encyclopedia of experience* which was responsible for: the balanced/opposed principle for compressors... the world's first 2-cycle turbo-supercharged gas-engine-driven compressors and the oil seal that made centrifugal compressors practical.

These are but a few of the "firsts" and of the developments, plus the precision and performance, with which Clark engineering is credited. All stem from the Clark *encyclopedia of experience.*

If you use air or gas, you can get full information about Clark products to serve your industry by calling your nearby Clark engineer. Or write Clark Bros. Co., 1101 Lincoln Avenue, Olean, New York.

**CLARK BROS. CO.**

*One of the Dresser Industries*

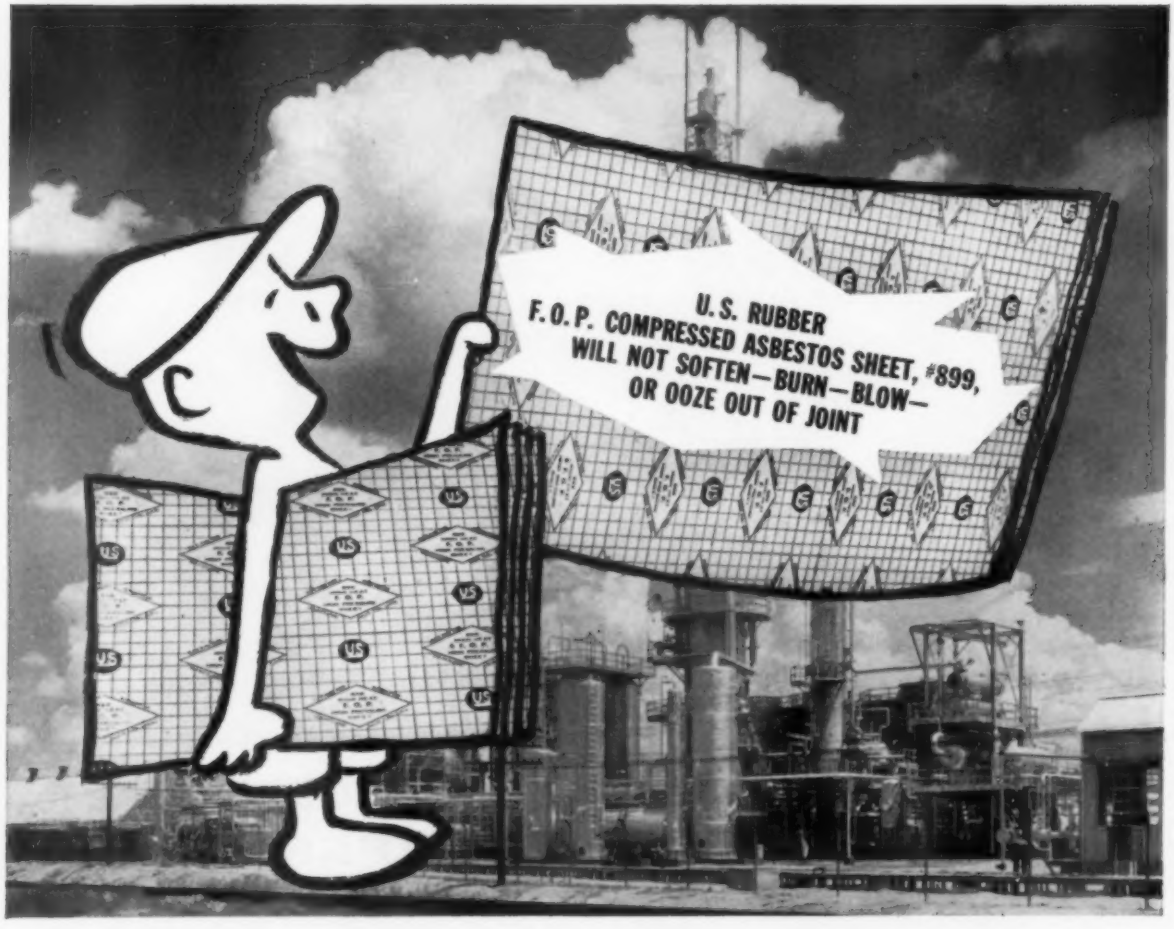
Sales and service outlets in principal cities throughout the world

CLARK®

**COMPRESSORS • GAS TURBINES**

US RUBBER PACKING

# HOT NEWS for Hot Joints and Flanges




This is the packing that's making headlines where the going's the hottest... where flanges or joints must be packed against superheated or saturated steam, air, water, ammonia, gases, oil, gasoline and many chemicals.

U. S. Compressed Asbestos Sheet Packing was the first of its type developed particularly for refineries and chemical plants. It is made by a special process from selected long-fibre asbestos and bonded with exacting combinations of heat-resistant materials. Balanced construction makes this packing ideal for use as Still Head Gaskets.

U. S. Rubber Compressed Asbestos Sheet Packing can be furnished in a variety of constructions, each specially suited to a specific requirement. They are some of the hundreds of styles of U. S. Rubber Packing available at any of the 28 "U. S." District Offices, at selected distributors, or by writing us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

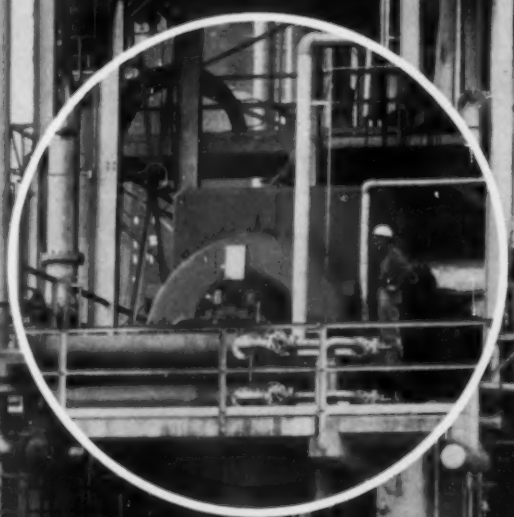
Mechanical Goods Division
**United States Rubber**

See things you never saw before. Visit U. S. Rubber's new Exhibit Hall, Rockefeller Center, N.Y.

Modern refinery processes use

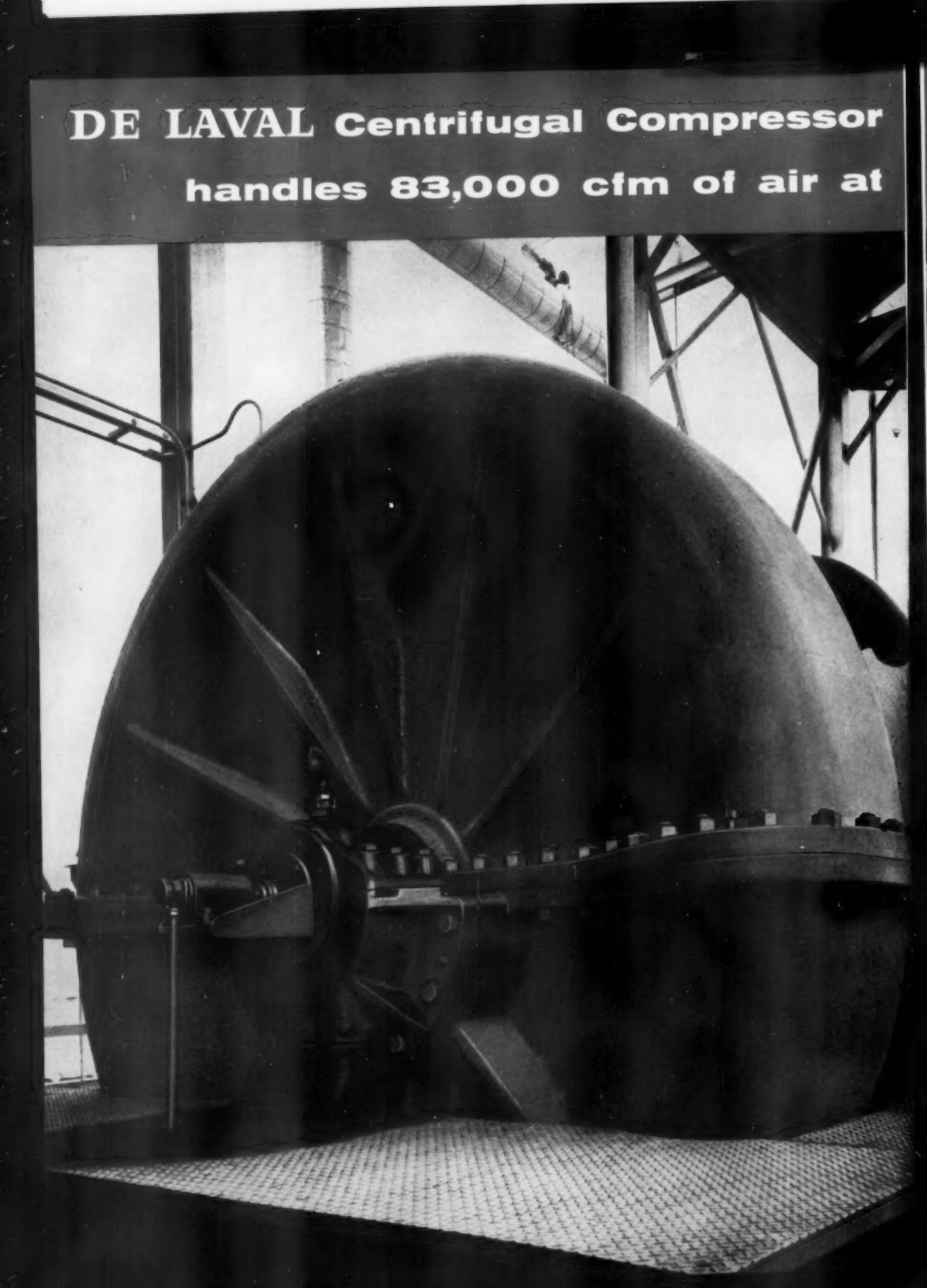
# DE LAVAL

## CENTRIFUGAL COMPRESSORS



DE LAVAL STEAM TURBINE COMPANY • TRENTON 2, NEW JERSEY

# DE LAVAL Centrifugal Compressor handles 83,000 cfm of air at



# Ashland Oil & Refining Company

This De Laval turbine-driven main air blower handles 83,000 cfm at 47.4 psia in the UOP Fluid Catalytic Cracking Unit at the Ashland Oil & Refining Company plant in Ashland, Kentucky. Built by Procon, Incorporated, the cat cracking unit processes 22,000 barrels per day.

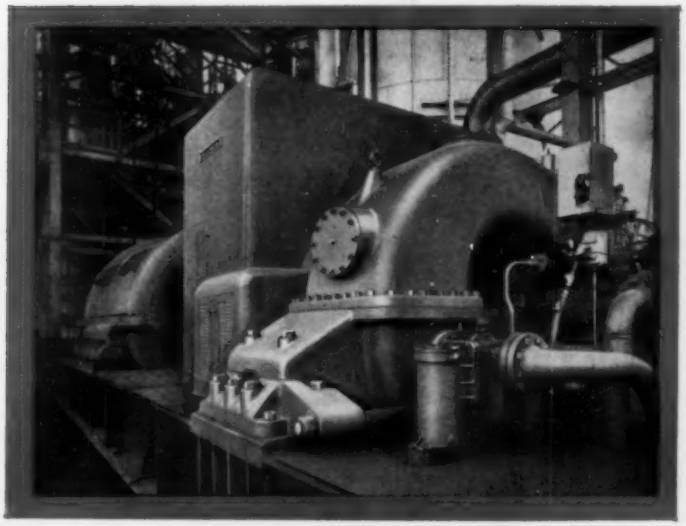
The compressor is driven by a 10,200 hp De Laval extraction turbine designed for 440 psi, operating at 700F with 1½" hg. vacuum. It extracts 150,000 pounds per hour at 155 psig.

As proof of the dependability of De Laval design and manufacture, another De Laval turbine-driven main air blower, which will deliver 110,000 cfm, is on order for a new UOP Fluid Catalytic Cracking Unit. The processing unit is currently being constructed for a leading Midwest refinery.

**Available for every refinery process**

Whether you need to handle light or heavy gases at high or low pressures in catalytic cracking, reforming, alkylation, coking or any similar service, it pays to look to De Laval. Rugged De Laval centrifugal compressors perform dependably in heavy-duty continuous operation. De Laval has more than 40 years of experience in solving gas compression problems.

**Send for De Laval Bulletin 0504.**



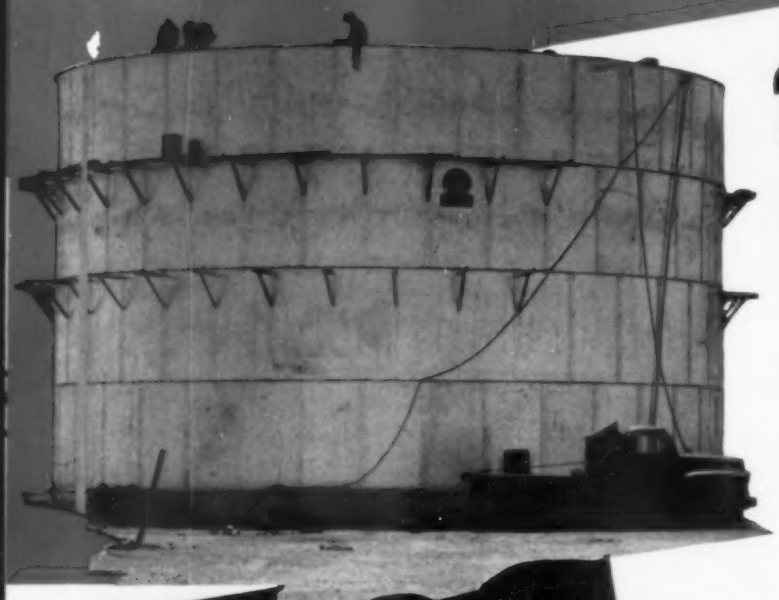
DE LAVAL

*Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY

*810 Nottingham Way, Trenton 2, New Jersey*

DL 389



# 2 ways to get a tighter tank faster

## 1. Specify Bolted Steel Tanks

MASTER-CRAFTED BY COLUMBIAN SINCE 1893

## 2. Call your nearest COLUMBIAN Distributor!

Tank crews can tell you that you **can't** beat Columbian Bolted Steel Tanks for tightness and fast erecting time. That's because these master-crafted, precision made Columbian tanks **just** "fit up" better . . . and Columbian supplies the most modern gasket **and** moulded joint materials for quick, tight construction.

There's still another way to speed up that tank you need right now. That's to call your nearest Columbian Distributor, listed below. He'll have the size tanks you want quickly available at your site.

**COLORADO**
O'Neill Tank Co.
Sterling, Colo.

**KANSAS**
O'Neill Tank Co.
P. O. Box 771
Great Bend, Kans.

Hays, Kans.
Hill City, Kans.
Meade, Kans.

**LOUISIANA**
McGuffin Tank Co.
P. O. Box 724
Shreveport, La.

McClatchey Tank & Supply Co.
Lafayette, La.

**NEW MEXICO**
Allied Supply Co.
P. O. Box 217
Artesia, N. M.

American Tank & Steel Co.
P. O. Box 1177
Farmington, N. M.

**TEXAS**
Gray-Brown Tank Co.
P. O. Box 924
Longview, Texas

Mapp Tank Co.
P. O. Box 1349
Odessa, Texas

Martin Tank Co.
P. O. Box 135
Corsicana, Texas

Kilgore, Texas

Federal Tank Co., Inc.
First State Bank Bldg.
Bellaire, Texas

**TEXAS (Cont'd)**
Texas Gulf Tank Co.
P. O. Box 14281
Houston, Texas

Westex Tank Co.
P. O. Box 941
Odessa, Texas

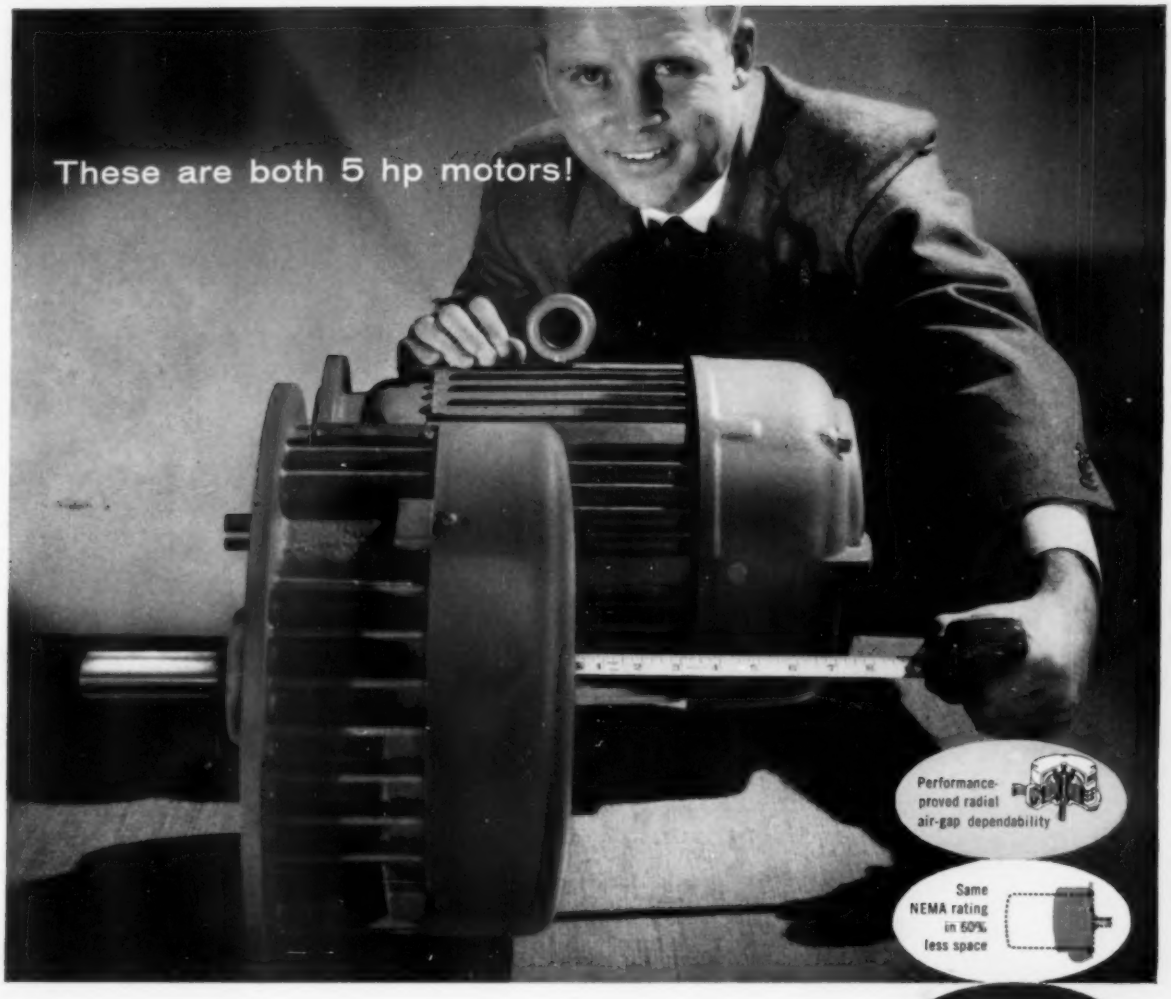
Columbian Steel Tank Co.
(warehouse)
3705 McKinney Ave.
Houston, Texas

B. A. Box
P. O. Box 42
Beeville, Texas

**COLUMBIAN STEEL TANK CO.**
P. O. Box 4048-J — Kansas City, Mo.

Want to know more about what makes tanks tight? Send for this most unusual handbook of valuable information and specifications. IT'S FREE!

*STEEL—Master-crafted by Columbian . . . First for Lasting Strength*




# 60% shorter– but with radial air-gap design!

## New Louis Allis Pancake Motor preserves all the advantages of conventional motor construction

The new Louis Allis Pancake Motor is your solution to trouble-free power in any space-cramped motor application.

The Pancake is a remarkably short flange-mounted motor — up to 60% shorter and 33% lighter than standard motors of the same rating! And it is built in *conventional* radial air-gap design!

It's done by an ingenious forming process which literally compresses the end coils of a conventional radial air-gap motor into an exceptionally short length. The result is a compact, light motor ideally suited for horizontal or vertical mounting on machine tools, roof ventilating fans, or *any* close-quarter installation where space is a critical design factor.

What's more, this is achieved without sacrificing a single desirable characteristic: the stator still contains the same iron and copper as standard Louis Allis motors . . . standard NEMA service factor is maintained . . . high insulative values are retained by using proved Louis Allis varnishes and new insulating techniques . . . over-sized pre-lubricated bearings are used to guarantee long bearing life . . . and the entire motor is enclosed in an industrial-type cast-iron housing designed to shrug off abuse!

SM-101

The housing and flange are cast in one piece: this permits extra-accurate internal machining which extends bearing life and reduces noise levels to a new low.

Investigate the Pancake Motor through your local Louis Allis District Office. Sized from 1 to 15 hp, at 1800, 1200, and 900 rpm, in open drip-proof and enclosed non-ventilated or fan-cooled enclosures. Write for Bulletins 2100 and 2150 to the Louis Allis Co., 449 E. Stewart St., Milwaukee 1, Wis.

**LOUIS ALLIS**

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

# Which Unibolt stem seat has been in corrosive gas-distillate service for 8 years?

UNIBOLT Christmas tree fittings — tees, crosses, positive chokes, adjustable wing valves — trimmed in exclusive UNIBOLT "SA" Stainless, or made entirely of this special analysis alloy, are winning the fight against corrosive fluids and gases.

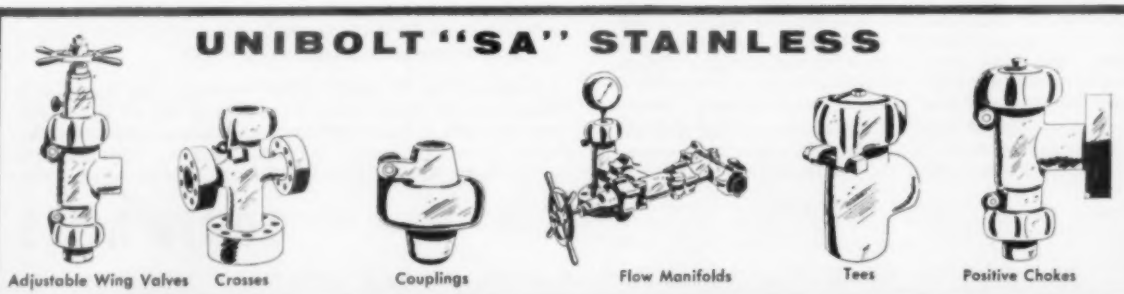
Production containing either hydrogen sulphide or carbon dioxide, or both, usually attacks and quickly destroys carbon steel and some alloy steel parts.

A standard UNIBOLT Adjustable Wing Valve, installed on a corrosive well in the Katy Field (Texas Gulf Coast) required replacement of the carbon steel seat in only 45 days. A UNIBOLT "SA" Stainless Valve installed at that time has shown no corrosion damage in eight years. As the above photograph reveals, the 8-year-old stem seat (right) still shows no sign of corrosion, for all practical purposes is as good as the new stem seat (left).

Got any corrosive wells? A UNIBOLT representative will gladly give you full particulars and case histories on "SA" (Special Analysis) Stainless.

**THORNHILL CRAVER CO.**
P. O. BOX 1184 HOUSTON, TEXAS

## UNIBOLT "SA" STAINLESS

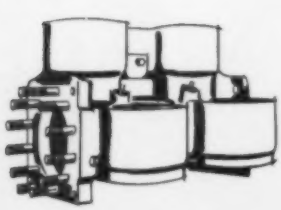


# GARDNER-DENVE

## ...quality lead

Five GX models availa
with horsepower ratin
350, 500, 625, 1000 and

**Eccentric Construction.** Eccentric construction results in large bearing area and low bearing pressures. Easily withstands high plunger loads from deep well drilling and jet bits.



**Divided Fluid Ends.** The famous Gardner-Denver divided fluid end construction reduces cylinder replacement costs. Interchangeable right- and left-hand cylinders simplify parts stocks.

**Unusual ac
ty.** All re
parts on the
Denver pu
readily acce
can be rep
the field.

**One-Piece Connecting Rods.** Gardner-Denver one-piece connecting or eccentric rods eliminate the danger of bolts working loose during operation.

# ER GX MUD PUMPS

## *aders in the field*

vailable,
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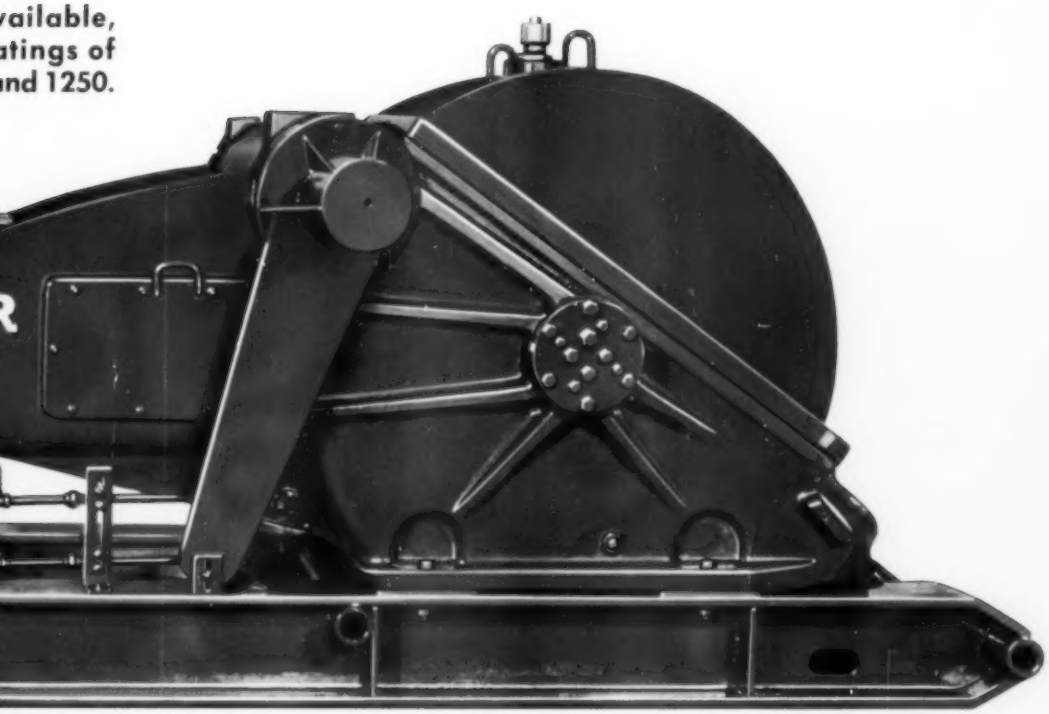
and 1250.



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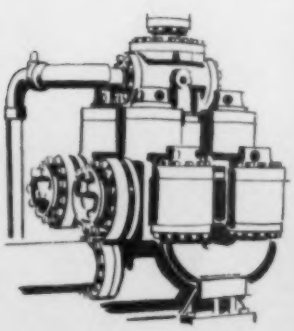
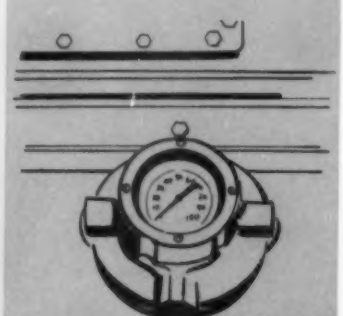
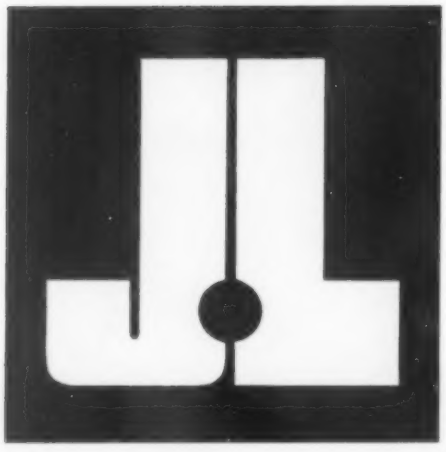


**Valves Quickly Reached.** Screwed valve pot covers save time on every valve inspection or replacement. On the 1250 hp. GXH, threaded fluid cylinder locks and rings are interchangeable with valve cover locks.



**Pressure Lubrication.** Positive pressure lubrication in the power end assures full lubrication of all moving parts. Oil stop head keeps oil in . . . mud out.

**Service Specialists Nearby.** Gardner-Denver service specialists are headquartered near every important drilling area to provide expert help on repair or replacement problems.



# NOW . . . ANOTHER GREAT NAME

## ADDED TO THE GARDNER-DENVER TEAM

## SERVING THE PETROLEUM INDUSTRY

**GARDNER-DENVER COMPANY**

**JONES & LAUGHLIN SUPPLY DIVISION**

**CONTINENTAL-EMSCO COMPANY**

Gardner-Denver Company is broadening distribution of its line of pumps to the petroleum industry through addition of the field outlets of Jones & Laughlin to the outlets of Continental-Emsco Company.

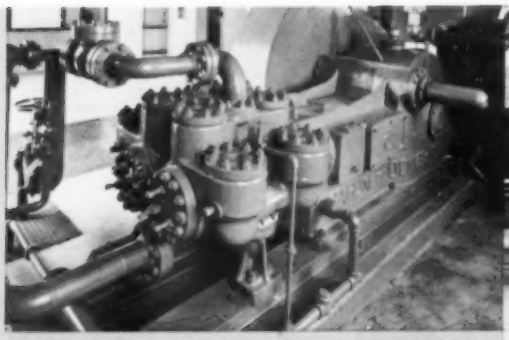
Appointment of Jones & Laughlin as co-distributors with Continental-Emsco Company, throughout the United States (except California) and Canada, assures Gardner-Denver oil field customers of outstanding service and fast deliveries.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

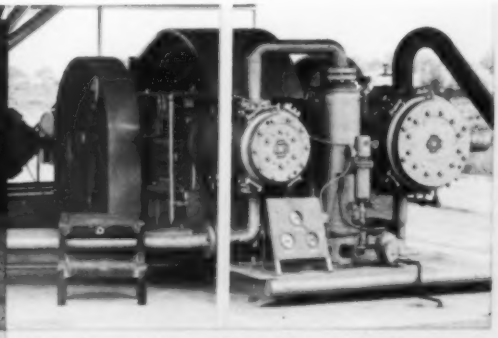
**GARDNER - DENVER**

Gardner-Denver Company, Quincy, Illinois

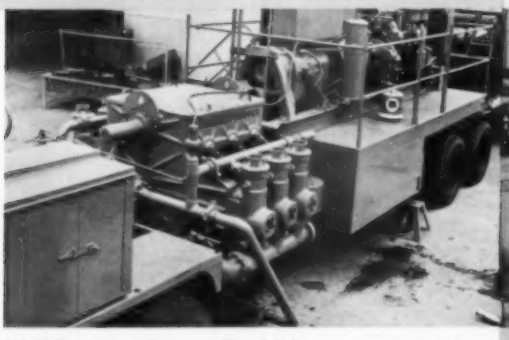
# GARDNER-DENVER QUALITY EQUIPMENT FOR THE PETROLEUM INDUSTRY



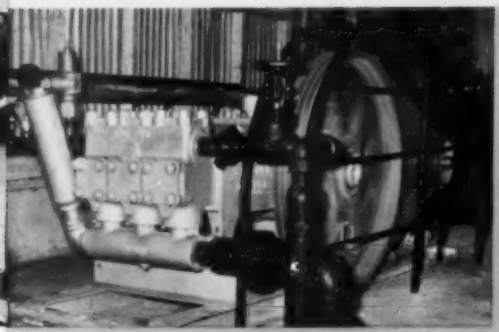
**FX Power Pumps.** Gardner-Denver rugged FX power pumps for mud, oil line and water supply service. Horsepower ratings from 16 to 255.



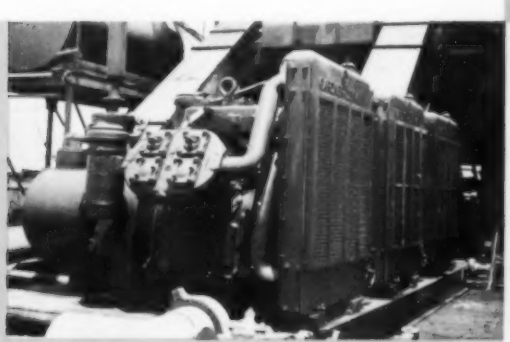
**Gas Compressors.** Complete units for repressuring, boosting, air-gas lift. Wide range of capacities and pressures for most field conditions.



**Well Servicing Pumps.** For high pressure cementing, acidizing, fracturing, work-over service. Four models—pressure range to 10,000 psi.



**Waterflood Pumps.** For waterflooding or salt water disposal. Six models—pressures to 3360 psi.—capacities to 13,200 bbls. per day.



**Air Drilling Compressors.** Air and gas units engineered to meet requirements of air drilling and mud aeration under various conditions.

**Also:**

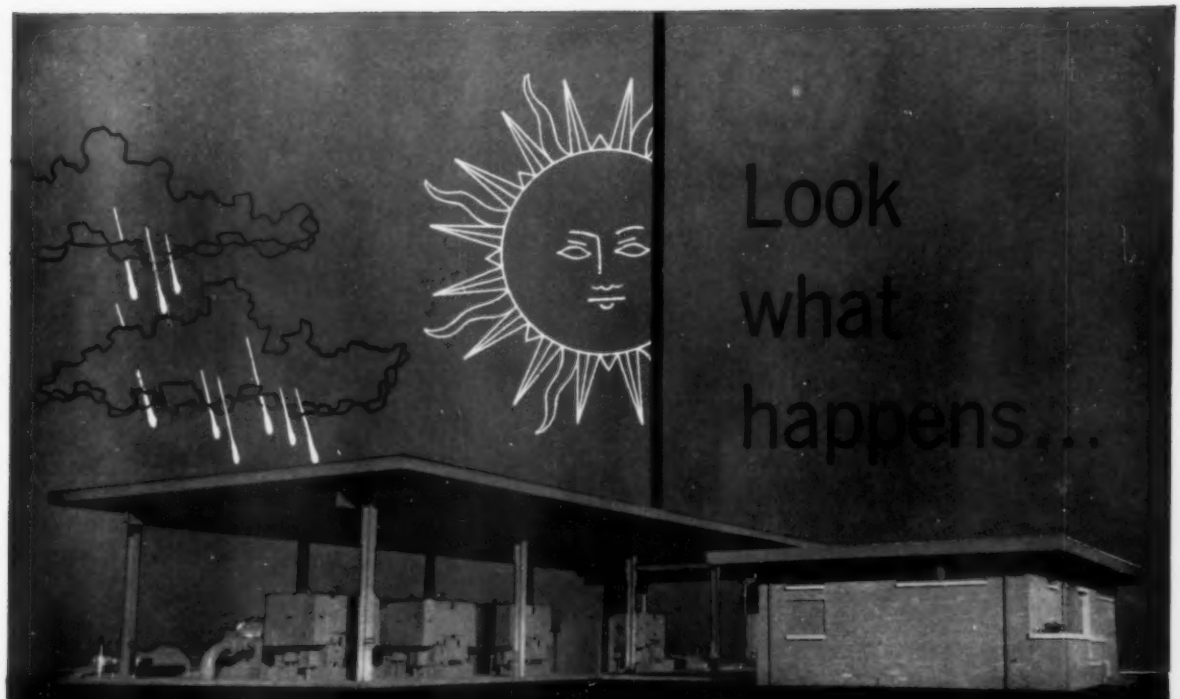
**Expendable Mud Pump Parts**
**Steam Pumps for Boiler Feed and General Service**
**Centrifugal Pumps for Water Supply and General Use**
**Air Compressors for Engine Starting, Rig Use and General Air Service**
**Rotary Portable Air Compressors**
**Pipeliners' "Quadril"***
**Pipeliners' "Twindril"®**
**Rock Drills and Air Tools**
**Air Hoists and Air Motors**
**Portable Air Drills and Tools**

*Trade-Mark

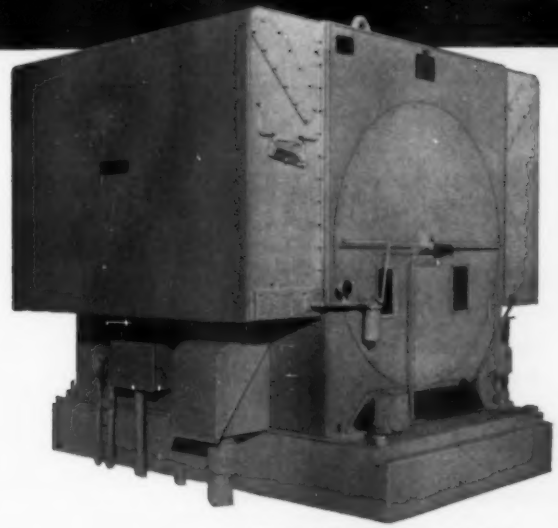
ENGINEERING FORESIGHT—PROVED ON THE JOB
IN CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

# GARDNER - DENVER

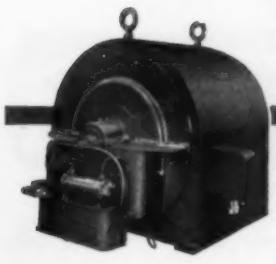
Gardner-Denver Company, Quincy, Illinois




# when **ELLIOTT** weather-protected motors are installed in an Outdoor Pipeline Station!



This Elliott 1250-hp, 2-pole, squirrel-cage induction motor, originally round frame as below, is one of the three motors which was rebuilt for year 'round weather protection. All four Elliott motors at the Laura Station are direct-connected to the oil pumps.



One of the three Elliott round-frame motors as it appeared originally.

*Costs Are Slashed.* The outdoor structure costs far less and maintenance as well as year 'round operating costs are reduced. Besides that, Elliott motors are especially designed for safe, dependable, trouble-free operation *in all kinds of weather.*

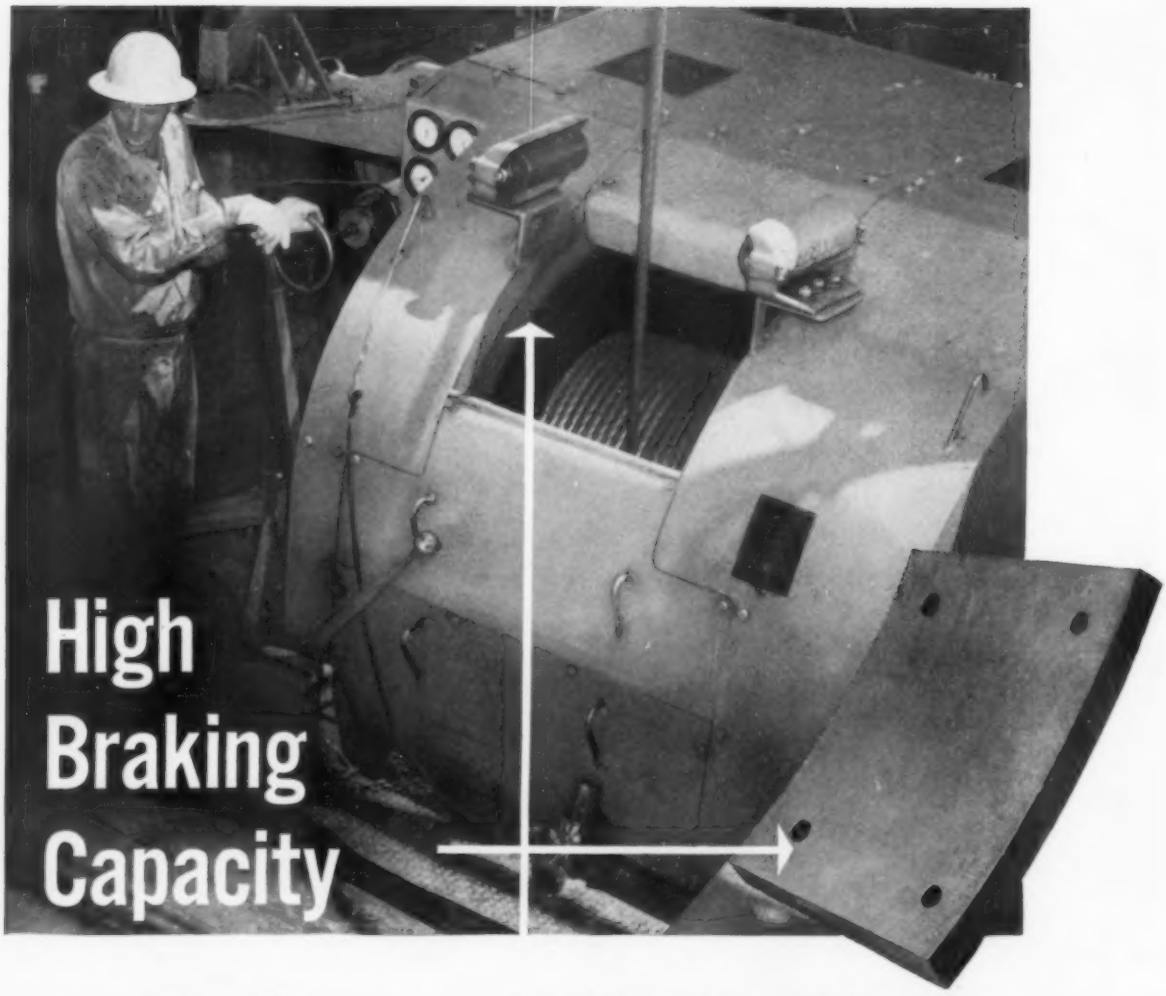
Take the case of the Service Pipeline Company in Illinois. Rebuilding the above Laura Station as an outdoor facility, this company installed four Elliott weather-protected squirrel-cage induction motors. The station includes a canopy which gives extra protection from rain and sun—added insurance against the possibility of direct sunlight tripping the thermal devices, and provides a chain hoist for maintenance. Both the concrete slab area and the canopy extend far enough to provide ample working space around pumping units.

Three of the four motors, originally dripproof round-frame, were rebuilt to weather-protected designs—resulting in additional savings. Windings were given added treatment by immersing coil ends and baking. Explosion-proof bearing temperature and oil pressure relays were provided to assure maximum safety for operation in a hazardous atmosphere. These and other features of the Elliott weather-protected motors permit the erection of simplified outdoor stations instead of more costly enclosed housings. For further details, call your nearby Elliott District Office or write . . .

**ELLIOTT Company**

Ridgway Division • Ridgway, Pa.

R7-1




# with Thermoid Brake Blocks

Choice of leading original equipment manufacturers and drilling contractors everywhere, Thermoid Brake Blocks withstand highest operating temperatures without crumbling or loss of shape. The solid woven asbestos tape (no plies) assures uniform friction, maximum safety, extra long life. Thermoid's special resins won't bleed or leave residue on drums. Split-type sleeve prevents 'chucking.' Because the braking surface is pre-ground to accurate limits, no 'running-in' is required.

**On original equipment, or when you're making replacements, always insist on Thermoid.**

**Specify Thermoid Powerflex Rotary Hose and Multi-V Belts for rugged oil field service.**

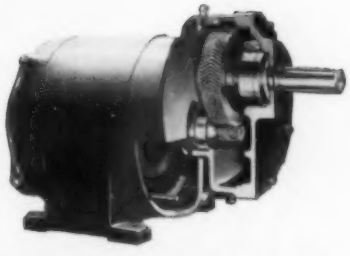
Thermoid

Thermoid Company
Offices and Factories
Trenton, New Jersey • Nephi, Utah

# EVEN MONEY IT'S A MASTER GEARMOTOR GOING TO WORK!

We *make* a lot of Gearmotors here at Master. The point is, we've been *selling* more than all other makes combined. There are more Master Gearmotors in *use* than all others. Users *buy* more. And you don't find any foolish motor buyers—or not for long.

So it's obvious that Master Gearmotors simply must meet most requirements best. If you're not a Master Gearmotor user, now's the time to find out what you're missing!



Master Gearmotors are available with all Master motor types in right angle and parallel construction.

**IT'S TIME YOUR DRIVE REQUIREMENT MEETS ITS MASTER**

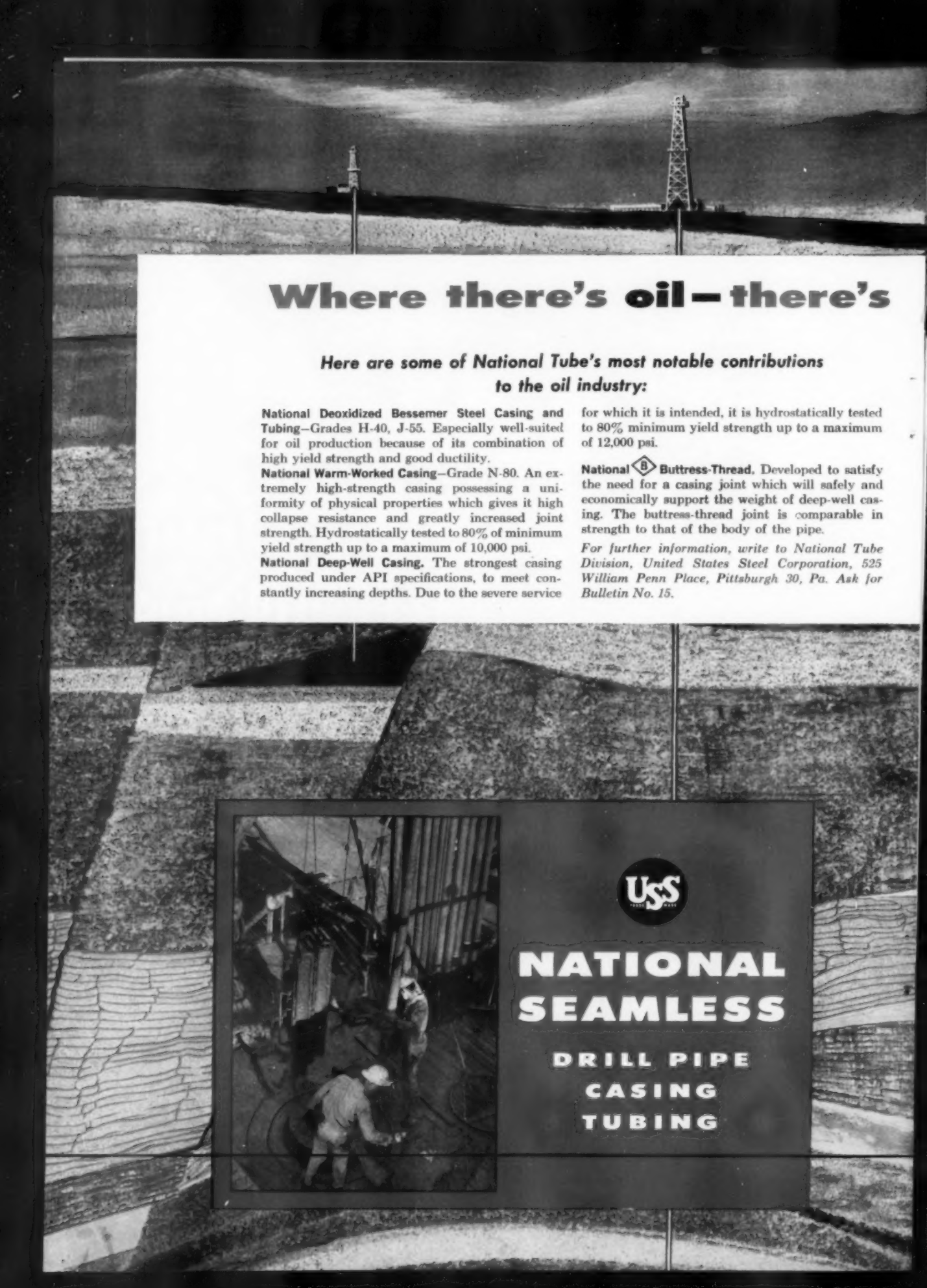
With five types of parallel and right angle Gearmotors, Master has the flexibility and choice of design you need.

With electric motor and gears combined into a compact, integral power unit, you reduce costs and increase efficiency through elimination of belts, couplings, chains, sprockets, external bearings or separate reducers.

They are available in sizes from ⅛ to 125 H.P. You can integrate with the gearmotor: electric brakes, 3 types of variable speed units and fluid drive in any combination.

**THE MASTER ELECTRIC COMPANY** • Dayton 1, Ohio

DIVISION OF RELIANCE ELECTRIC AND ENGINEERING CO.



# Where there's oil—there's

***Here are some of National Tube's most notable contributions to the oil industry:***

**National Deoxidized Bessemer Steel Casing and Tubing**—Grades H-40, J-55. Especially well-suited for oil production because of its combination of high yield strength and good ductility.

**National Warm-Worked Casing**—Grade N-80. An extremely high-strength casing possessing a uniformity of physical properties which gives it high collapse resistance and greatly increased joint strength. Hydrostatically tested to 80% of minimum yield strength up to a maximum of 10,000 psi.

**National Deep-Well Casing.** The strongest casing produced under API specifications, to meet constantly increasing depths. Due to the severe service for which it is intended, it is hydrostatically tested to 80% minimum yield strength up to a maximum of 12,000 psi.

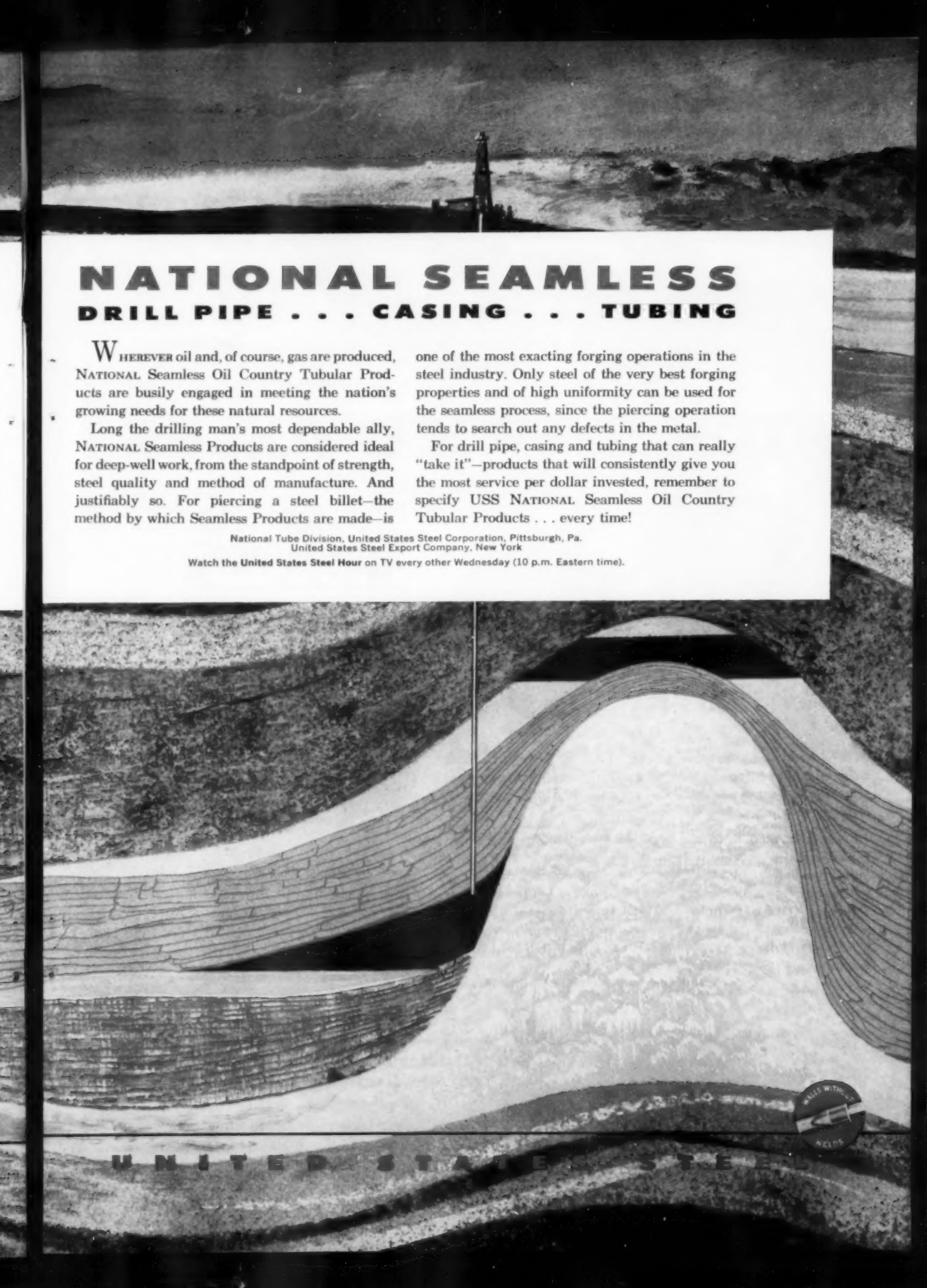
**National (B) Buttress-Thread.** Developed to satisfy the need for a casing joint which will safely and economically support the weight of deep-well casing. The buttress-thread joint is comparable in strength to that of the body of the pipe.

*For further information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Ask for Bulletin No. 15.*

USS

**NATIONAL SEAMLESS**

**DRILL PIPE**
**CASING**
**TUBING**



# NATIONAL SEAMLESS

## DRILL PIPE . . . CASING . . . TUBING

WHEREVER oil and, of course, gas are produced, NATIONAL Seamless Oil Country Tubular Products are busily engaged in meeting the nation's growing needs for these natural resources.

Long the drilling man's most dependable ally, NATIONAL Seamless Products are considered ideal for deep-well work, from the standpoint of strength, steel quality and method of manufacture. And justifiably so. For piercing a steel billet—the method by which Seamless Products are made—is one of the most exacting forging operations in the steel industry. Only steel of the very best forging properties and of high uniformity can be used for the seamless process, since the piercing operation tends to search out any defects in the metal.

For drill pipe, casing and tubing that can really "take it"—products that will consistently give you the most service per dollar invested, remember to specify USS NATIONAL Seamless Oil Country Tubular Products . . . every time!

National Tube Division, United States Steel Corporation, Pittsburgh, Pa.
United States Steel Export Company, New York

Watch the **United States Steel Hour** on TV every other Wednesday (10 p.m. Eastern time).

UNITED STATES STEEL

# TRUCKS GO

when they are equipped with

# EATON 2-SPEED AXLES

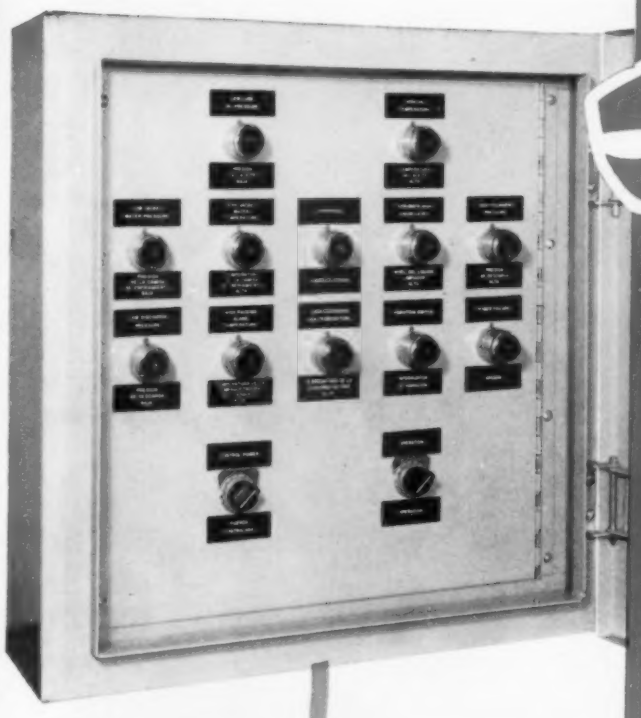
**W**herever trucks have to go—on or off the highway—Eaton 2-Speed Axle equipped trucks go quicker—and at lower cost per mile. That's because Eaton 2-Speeds provide a *right* gear ratio for every hauling situation.

To enable truckers to "make time" on the open highway, Eaton 2-Speed Axles provide a HIGH-HIGH ratio—trucks GO at top legal speeds. When POWER is needed on steep grades or to pull out of tough off-the-highway spots under full load, drivers select the LOW-LOW ratio—and GO! This wider choice of gear ratios means reduced stress and wear on engines and other vital truck parts. It means that Eaton 2-Speed Axle trucks keep GOing for many extra thousands of trouble-free miles—they cost less to operate and maintain, and are worth more at trade-in time.

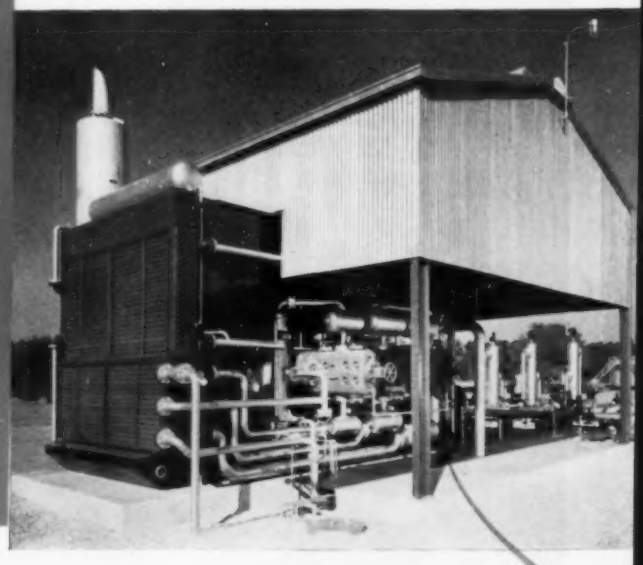
More than Two Million Eaton Axles in Trucks Today. For complete information, see your truck dealer.

**EATON** AXLE DIVISION MANUFACTURING COMPANY CLEVELAND, OHIO

**PRODUCTS:** Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



Southwest



# NOW THE NEW PANEL CONTROL FOR UNATTENDED COMPRESSOR STATION OPERATION

Southwest Packaged Gas Compressors can now be furnished with automatic shutdown and panelboard indicator equipment custom built to the particular requirements of your station.

Any combination of automatic shutdowns, working through a solenoid controlled valve in the fuel gas system, protects your engine against malfunction.

During normal operation, the signal lights on the panelboard remain off. When any one control switch becomes actuated due to abnormal operation, the signal light corresponding to that switch goes on. The engine shuts down automatically. All other relays are locked out, and the one signal light remaining on indicates the exact switch which caused the engine to shut off.

FOR GAS LIFT, GAS BOOSTER, PRESSURE MAINTENANCE AND SIMILAR PROJECTS.

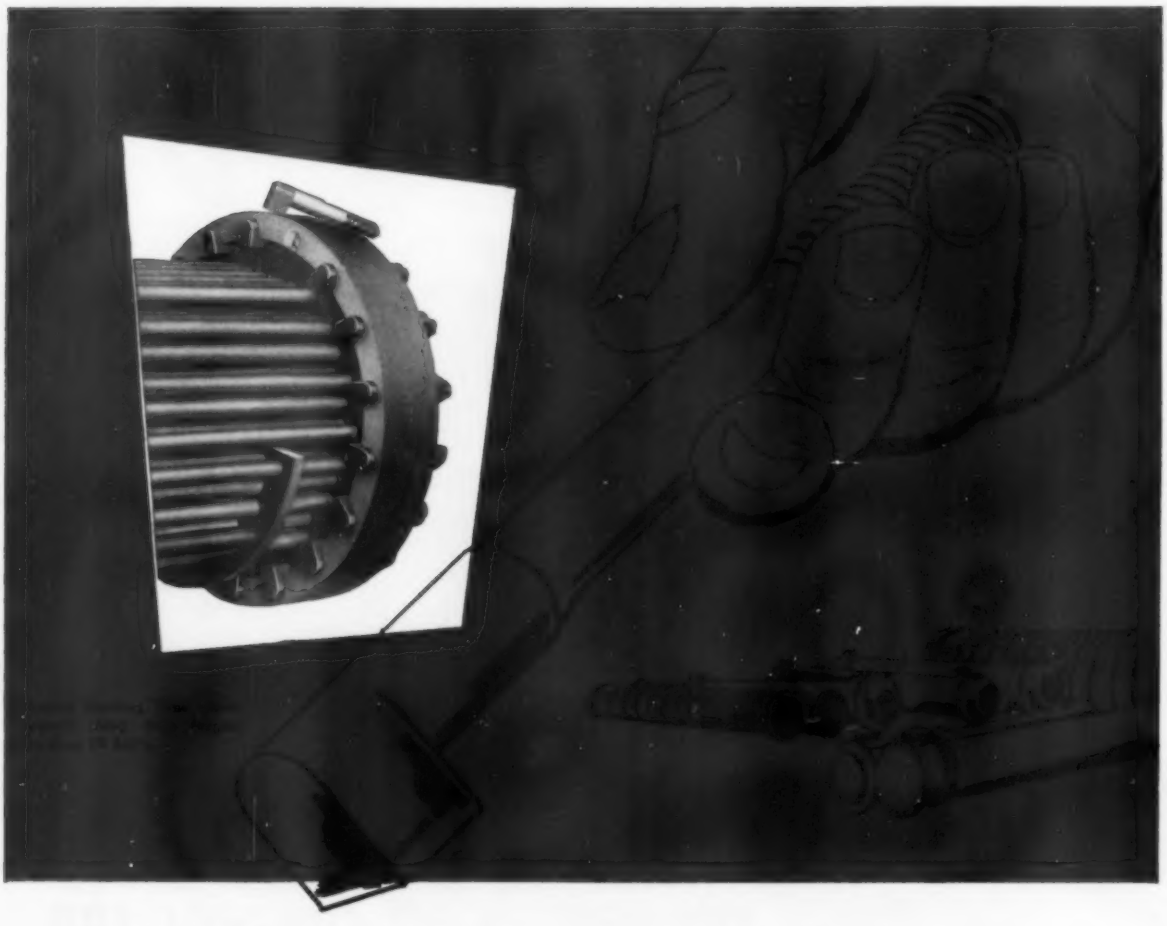
As many as fifteen separate functions can be pinpointed by this panel indicator. Your maintenance men can get your compressor back on stream faster.

Southwest engineers will give you full details on this protective equipment for unattended compressor operation.

This is another development by Southwest to improve the operation of Packaged Gas Compressors.


**SOUTHWEST INDUSTRIES, INC.**

Post Office Box 19392, Houston 24, Texas



# This Ell Bolt is the Key to leak control

The patented Ell Bolt construction employed on Vogt floating head heat exchangers is the answer to re-assembly without distortion or leak development.

Cover may be removed by simply loosening the Ell Bolt nuts and disengaging the Ell Bolt heads from the "lock notches." No misplacing of Ell Bolts can result — and tightening is easy and positive — absolutely leak proof. Send for Bulletin HE-6. Address Dept. 24A-XO.

Vogt

**HENRY VOGT MACHINE CO., P. O. BOX 1918, LOUISVILLE 1, KY.**

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Philadelphia, St. Louis, Charleston, W. Va., Cincinnati, San Francisco

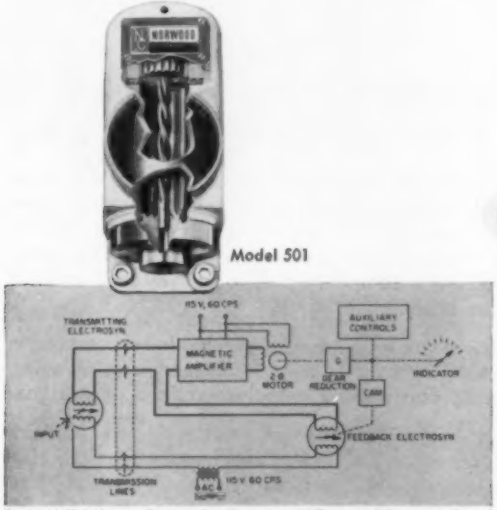
**OTHER VOGT PRODUCTS**
Drop Forged Steel Valves, Fittings and Flanges in a complete range of sizes • Petroleum Refinery and Chemical Plant Equipment • Steam Generators • Heat Exchangers • Ice Making and Refrigerating Equipment.

## HEAT TRANSFER EQUIPMENT

# ELECTROSYN AT WORK

Leading pipe line companies are putting ElectroSyn Systems to work measuring and indicating operation pressures and flows and for digital telemetering.

Featuring high reliability, low maintenance and flexibility of application, the ElectroSyn System can withstand a static overload of 300% of rated pressure for a 1% zero shift.




**Basic Null-Balance System for Pressure, Differential Pressure, Level**

Basic system consists of signal transmitter, magnetic servo amplifier, null-balance indicator. (No electron tubes, slide wires or continuously moving parts.)

In measuring pressure the Model 501 transmitter utilizes a twisted bourdon tube as the pressure sensing element. This tube converts the pressure into shaft rotation of the ElectroSyn signal generator, a rotary differential transformer. Output from the ElectroSyn signal generator is an a-c voltage exactly proportional to the measured variable.

**Write for Brochure B257**

**SERVICE PIPE LINE CO.**

•

**TEXAS EASTERN TRANSMISSION CORP.**

•

**GULF INTERSTATE GAS CO.**

•

**SOUTHERN PACIFIC PIPE LINES, INC.**

•

**EL PASO NATURAL GAS CO.**

NORWOOD CONTROLS

NORWOOD CONTROLS UNIT

**DETROIT CONTROLS**

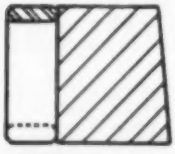
Division of AMERICAN-Standard

942 Washington Street, Norwood, Mass.

DETROIT CONTROLS PRODUCTS

# PEDRICK pioneered Conformable rings for big-bore engines

U.S. Patent No. 2,771,329



**TF7 DESIGN**

***This design is recommended especially for 4-cycle engines***

## *Here's Pedrick's Conformable*
## TAPER-FACE COMPRESSION Ring

The big feature of the TF7 taper-face compression ring is its conformability under all kinds of cylinder conditions. Because of PEDRICK's exclusive "Equalizer," which exerts a positive and uniform pressure outward at every point around the ring circumference, the cast-iron section is radially thinner, and therefore more flexible.

The taper-face of this conformable compression ring provides a line contact with the cylinder wall for higher unit pressure, quicker seating and sealing and less chance of scuffing.

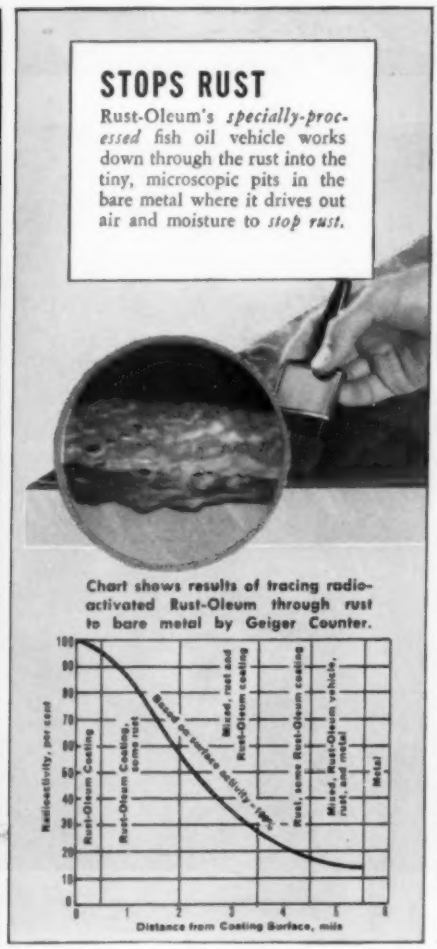
The TF7 ring is one of numerous modern designs used by PEDRICK engineers to *precisioneer* the very best combination of rings for maximum results in each particular installation. Take advantage of our Engineering and Consulting Service to help solve your ring problems. Write, wire or phone: WILKENING MANUFACTURING CO., Philadelphia 42, Pa. SAratoga 9-3770. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2.

**Pedrick PISTON RINGS**

# Three Rust-Oleum DIFFERENCES that save you time, money and metal!

## GOES ON FASTER

No tedious surface preparations usually required — just scrape and wirebrush to remove rust scale and loose rust — then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust.

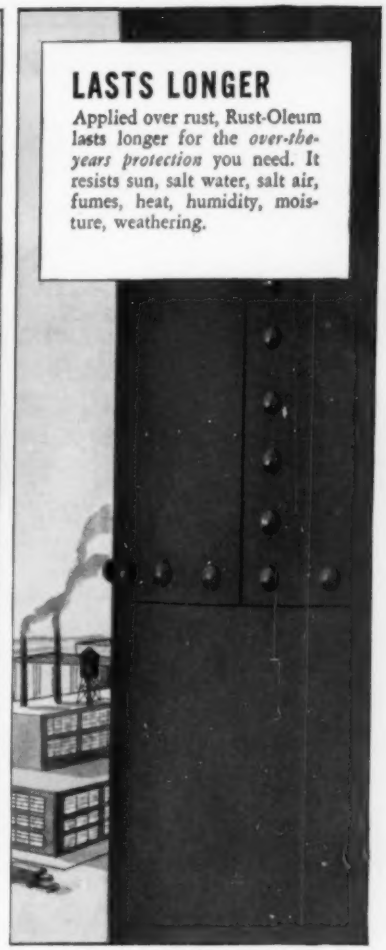


## STOPS RUST

Rust-Oleum's *specially-processed* fish oil vehicle works down through the rust into the tiny, microscopic pits in the bare metal where it drives out air and moisture to *stop rust.*

**Chart shows results of tracing radio-activated Rust-Oleum through rust to bare metal by Geiger Counter.**


Radioactivity, per cent
Rust-Oleum Coating
Rust-Oleum Coating, some rust
Mixed, rust and Rust-Oleum coating
Rust, some Rust-Oleum coating
Mixed, Rust-Oleum vehicle, rust, and metal
Metal
Based on surface activity = 100%
Distance from Coating Surface, mils



## LASTS LONGER

Applied over rust, Rust-Oleum lasts longer for the *over-the-years protection* you need. It resists sun, salt water, salt air, fumes, heat, humidity, moisture, weathering.

These are just a few of many important *differences* that separate Rust-Oleum from ordinary coatings. When you consider that Rust-Oleum covers approximately *30% more area,* depending upon surface condition and porosity . . . and the fact that Rust-Oleum finish coatings, with the same fish oil vehicle, are available in nearly every color for *double protection* . . . it's just good, common sense to use Rust-Oleum. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts.

# RUST-OLEUM®

# STOPS RUST!®

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

**ATTACH TO YOUR LETTERHEAD — MAIL TODAY**

**Rust-Oleum Corporation**
**2622 Oakton Street • Evanston, Illinois**

- ☐ Complete literature with color charts.
- ☐ 30-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

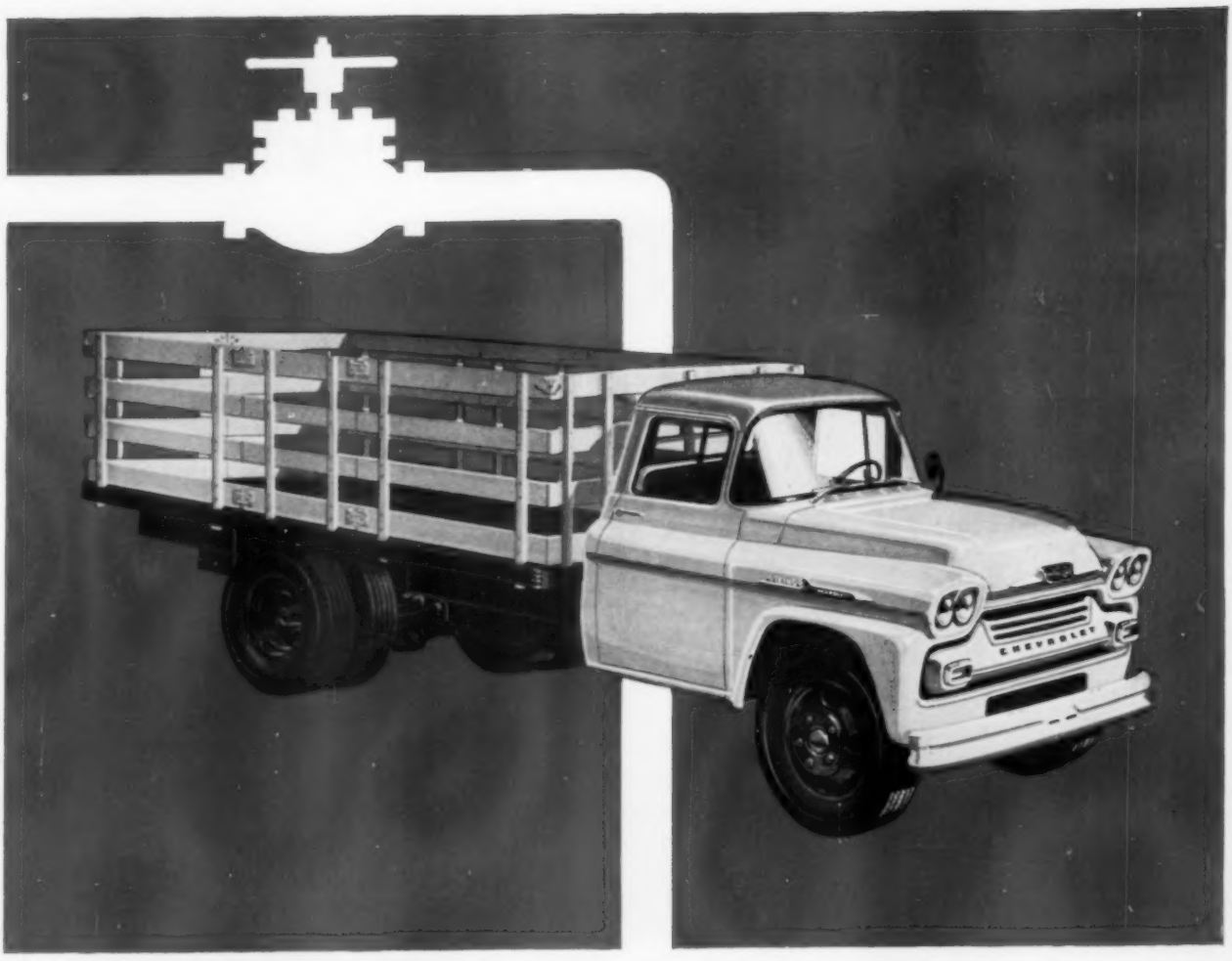
# *Never before has Chevy been so*

*Here's a truck specially designed to take to your kind of work like a duck takes to water! It's Chevrolet for '58 with new hustle, muscle and style that mean money in your pocket!*

As you can see, Chevy's a honey of a truck this year, and that handsome, broad-shouldered '58 appearance only hints at the host of new and improved features that are ready to put you dollars ahead in the years to come. *Here's a truck ideally suited for haulers in your line of work.* In styling, for instance, Chevrolet for '58 has what it takes to build your business prestige every day in the week: new dual headlamps, new massive grille, newly contoured hood, new cab beauty, to mention just a few innovations.

And what workers these new Chevrolet middleweights are! There's extra power to do more work faster from new, more durable V8's. The

CHEVROLET **NEW CHEVROLET**




# *right for hauling petroleum products!*

heavy-duty Taskmaster V8 is standard in Series 50 L.C.F. models and optional at extra cost in Series 60 conventional models. These engines are leaders in their respective classes for short-stroke efficiency, and they give you the economy and dependability benefits of high compression ratios, three fuel filters, chrome-plated top piston ring, roller-type timing chain and precision carburetion. Standard power for Series 60 models is the economy champ of the middleweight class, the newly improved 150-h.p. Jobmaster 6!

*High* G.V.W.'s—up to 21,000 lbs. with heavy-duty options—assure big, profitable payloads. Heavy-duty options, including heavier front and rear springs, 7,000-lb. capacity front axle and 16,000-lb. capacity rear axle, enable new Series 50 and 60 models to haul loads like heavyweights, yet provide middleweight truck economy. (Chevy leads the top-tonnage class, too, with new Series 90 and 100 models offering G.V.W.'s up to 36,000 lbs. and revolutionary new Workmaster V8!) Other work-whipping Series 50-60 components include husky parallel-design frame, hefty rear axle and the proper springs and transmissions to meet your needs precisely.

There are many such reasons why you'll want to see your Chevrolet dealer soon! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

# TASK · FORCE 58 TRUCKS

Anti-lock prevents relative rotation between anchor cage and tubing while running
Re-latch threads prevent upper slips from setting until ready.
Long, flexible drag springs allow easy recovery in case of washover.
Special seal protects against fouling from sand or scale.
Internal shoulder creates a differential piston inside rubber to cause a tighter seal.
Full setting force is transmitted to packing element through lower head. No scrubbing action between lower slips and casing wall during setting stroke.

Guiberson
permanent completion

# TYPE A DRILLABLE PACKER

## runs and sets easily, quickly

- ***Built-in safety against premature setting***
- ***Set and produce in ½ tubing trip***
- ***Unequalled rubber seal***

Guiberson Type A Drillable Packer gives you a versatile packer for many uses..single or multiple zone production, acidizing, pressuring operations, water-flooding, testing, corrosion control and many others.

New safety factors against premature setting are provided since the transmitting of drag from tight casing or impact from junk is direct to the tubing string.

The Type A can be set and placed in production with only ½ tubing trip. Spacing problems are easier, especially when run in combination with a multiple zone packer. From rig floor to completion, the Type A runs and sets faster than any other permanent packer.

Guiberson superior quality rubber and special lead-alloy thimbles compress fully for a leak-proof seal. Setting is quick, easy and uncomplicated..may be set by wire line. Available in 5" through 7⅝" sizes for 2" or 2½" tubing with a full line of stingers and accessories. Ask your Guiberson representative for a recommended installation or write for full details.

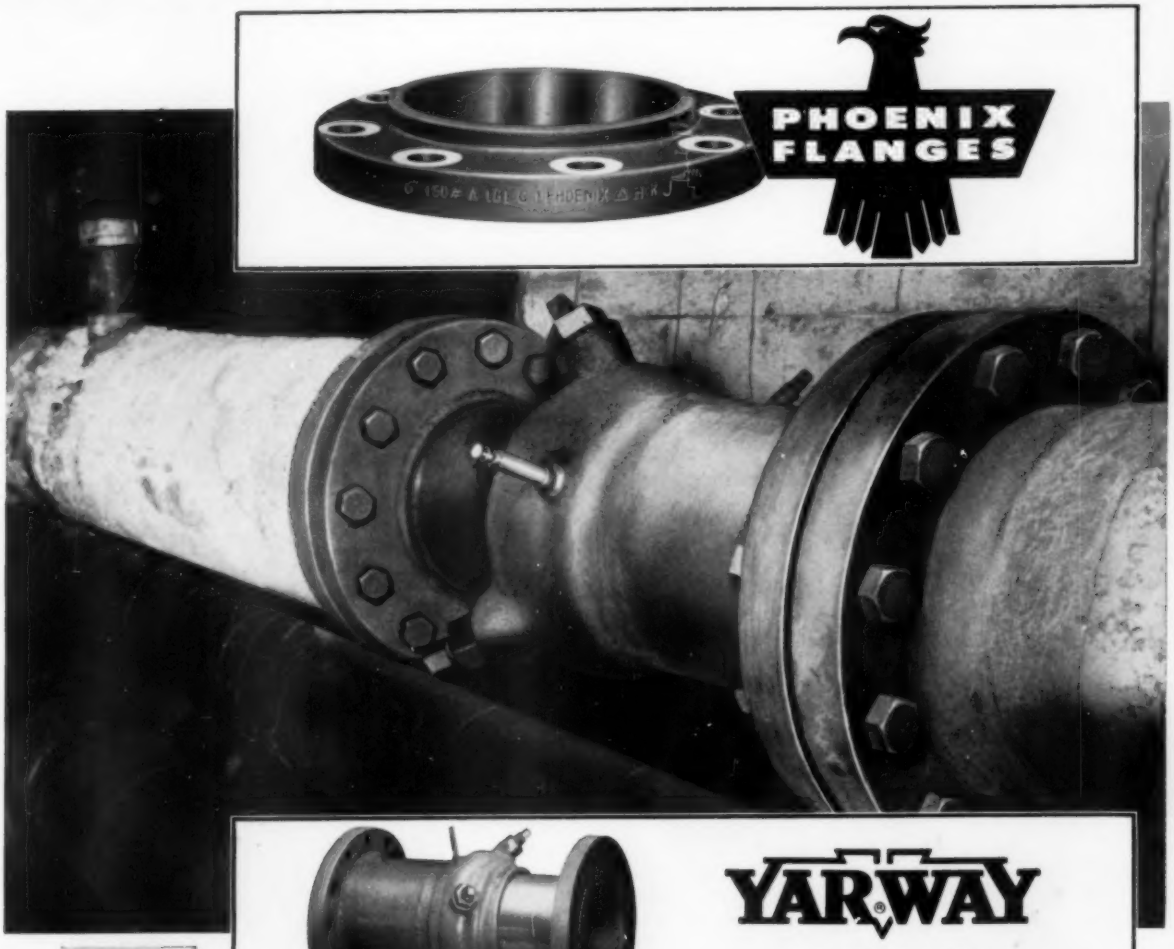
SAFER THAN SORRY — BETTER BE — GUIBERSON

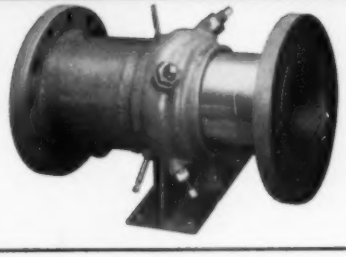
THE
GUIBERSON
CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by
Oil Field Supply Stores
Everywhere

# TWO QUALITY PRODUCTS TEAMED FOR AN EFFICIENT INSTALLATION



YARWAY

GUN-PAKT
EXPANSION JOINTS

Write for free 36-page pocket reference booklet

Because there is no need to shut down for repacking, the Yarway Gun-Pakt is one of the most popular expansion joints used in modern steam distribution lines. The Yarway joint is built for long service, with never any danger of metal fatigue or failure.

There must be no failure at flanged connections, either. That's why Yarnall-Waring Co. uses Phoenix forged-steel flanges on Gun-Pakt expansion joints.

Like Yarnall-Waring, you, too, will find that *you can't buy better flanges*. May we demonstrate the advantages of Phoenix service?

*Leading Manufacturers of Pipe and Tank Flanges and Commercial Forgings*

PHOENIX

FLANGE AND FORGING DIVISION

**PHOENIX MANUFACTURING COMPANY**

CATASAUQUA, PA. · JOLIET, ILL. · FOUNDED 1882

Integrated Manufacturing Facilities: FLANGE AND FORGING DIVISION, STEEL MILL DIVISION, HORSESHOE PRODUCTS DIVISION, RUBBER PRODUCTS DIVISION

# Just between us toolpushers... Morse H-E Chain lasts 4 times longer!

**WORRIED . . . 'cause deep drilling kept breaking even "special" roller chain. Chain repairs and lost drilling time were costing us plenty of money.**

**SURPRISED . . . when the Morse man proved High-Endurance Roller Chain lasts four times longer than other chain. Runs on standard sprockets, too.**

**WONDERED . . . why H-E Roller Chain costs 10% more. Now I know. It's better made . . . from tougher steels. But it pays for itself in a hurry.**

**GLAD . . . I tried it. Morse High-Endurance Chain is the only roller chain that'll stand up to the tough drilling jobs I run across nowadays.**

Take it from a toolpusher . . . he knows from experience. Better still, insist on Morse High-Endurance Chain at your local supply store. You'll see in a hurry why H-E Chain takes today's rugged oil-field conditions better than any other roller chain you can buy.

MORSE CHAIN COMPANY, Ithaca, N. Y.—Warehouses in: Houston and Odessa, Tex.; Farmington and Hobbs, N. M. Export: Borg-Warner Intl., Chicago 3, Ill.

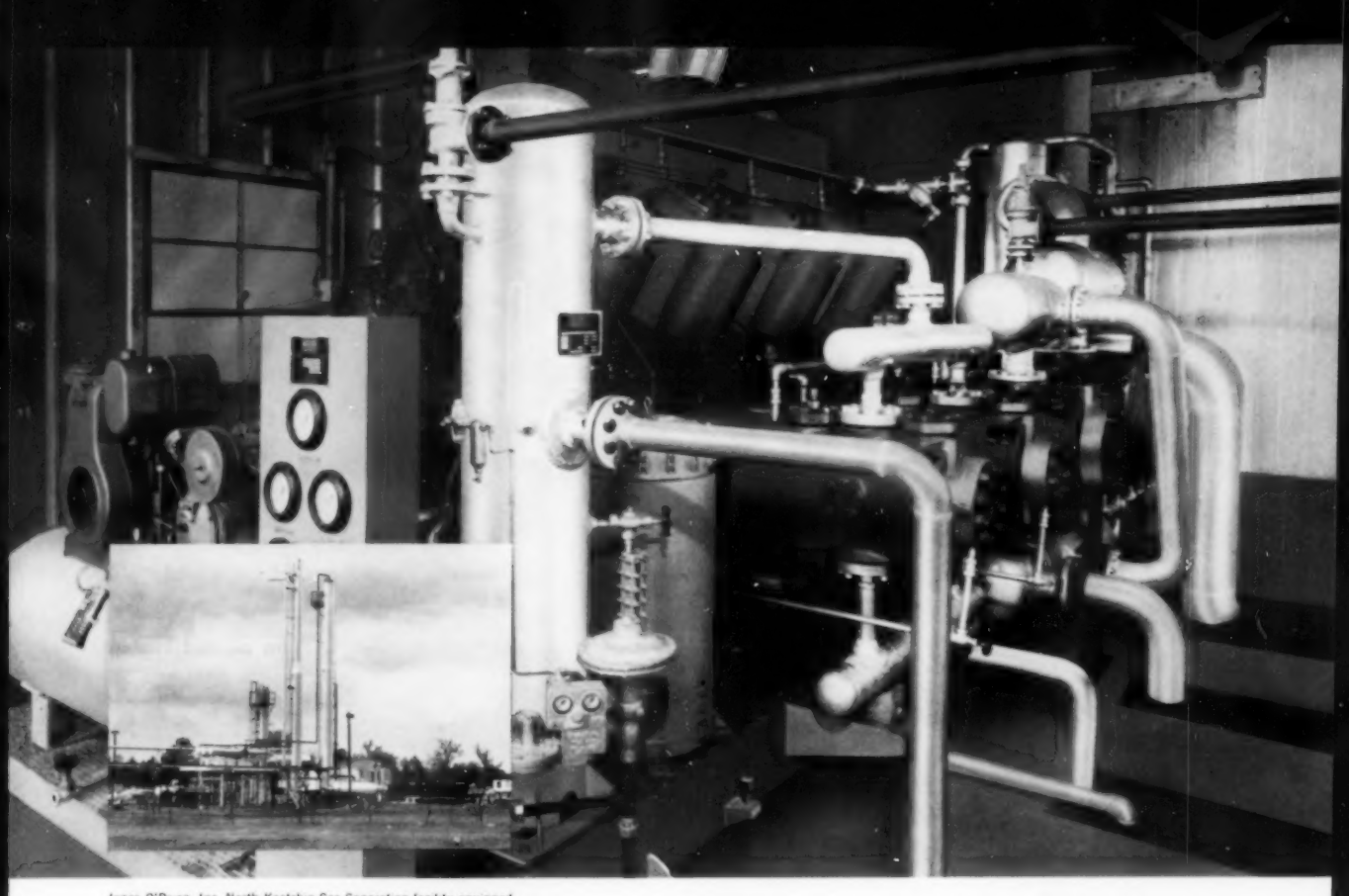
IN POWER TRANSMISSION
THE TOUGH JOBS COME TO

MORSE

*Trademark

**Remember: Only Morse offers you all four of these basic drives: Roller Chain, Silent Chain, Hy-Vo,® and "Timing"® Belts**

# BEAIRD-INGERSOLL-RAND Packaged Compressor Plant



Jones-O'Brien, Inc. North Keatchie Gas Separation facility equipped with a Beaird-Ingersoll-Rand 440 h.p. 8SVG packaged compressor. Unit has radiator with lubricating oil cooler and updraft air turning duct. Semi-automatic operation has been achieved by equipping unit with speed and pressure regulators and shutdown devices. Other sizes from 120 to 660 h.p.

*Gas Separation Facility Uses*

## DUAL PURPOSE PACKAGED COMPRESSORS

Jones-O'Brien, Inc. has redesigned its North and South Keatchie gas separation facility to increase efficiency and convert to profits 2,200,000 cubic feet of gas being flared daily.

Both facilities have now been equipped with Beaird-Ingersoll-Rand packaged compressors. At the north facility an 8SVG 440 h.p. unit has been set up to perform a dual task. Two cylinders are compressing propane used as a refrigerant in the extraction process and two cylinders are boosting low pressure gas up to sales line pressure. The unit is set to supply 2.68 mmcfd of 200 psi propane from an input of 10 psi. The other two cylinders will boost 1.1 mmcfd of natural gas from 200 psi to 1,150 psi.

A 330 h.p. Beaird compressor at the South facility is boosting 1.2 mmcfd of natural gas to the sales line. Both units have been designed for semi-automatic operation. Engines are equipped with speed and pressure regulators that permit them to speed up and slow down to maintain a constant suction pressure. Other controls and shutdown devices protect the units from unforeseen changes in operating conditions.

*Let us show you how Beaird Packaged Compressor plants will fit into your plant modernizing program.*

BEAIRD
another AMF product
PACKAGED COMPRESSOR PLANTS

*LOWEST COST PER HORSEPOWER INSTALLED*

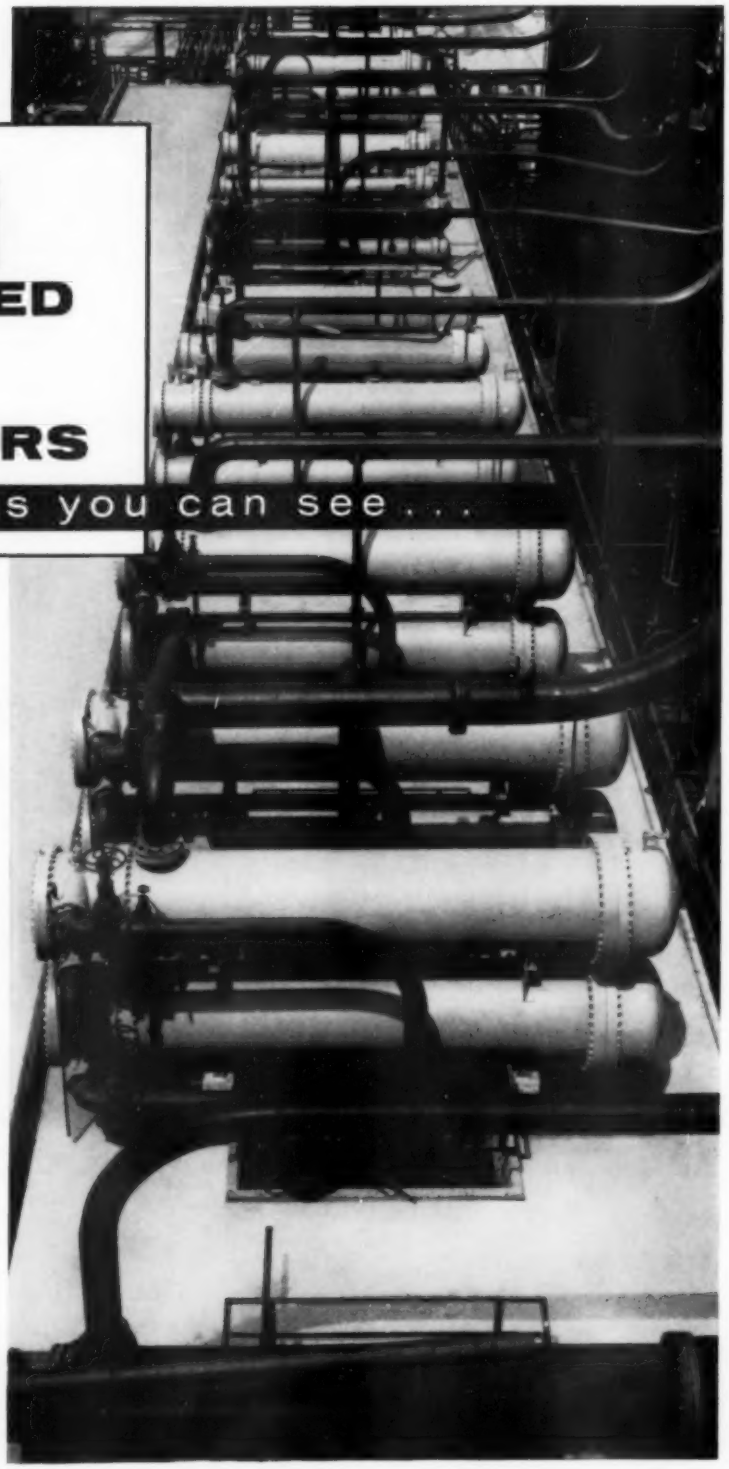
**THE J. B. BEAIRD COMPANY, INC.**
Shreveport, Louisiana

*A Subsidiary of American Machine & Foundry Company*

SHREVEPORT, LOUISIANA. *Sales Offices: Dallas, Houston, Corpus Christi and Midland, Texas • New Orleans, Louisiana • Tulsa, Oklahoma • Denver, Colorado Los Angeles, California • Caracas, Venezuela • Cie. Ingersoll-Rand, Paris, France.*

# YUBA
# ENGINEERED HEAT EXCHANGERS

as far as you can see . . .



. . . and what you see is still only a fraction of the more than 100 heat exchangers giving trouble-free service in the high octane plant of the Continental Oil Co. at Ponca City, Okla. The Yuba units in this refinery have a total of 140,418 sq. ft. of heating surface.

Heat exchangers for petroleum refineries and for chemical plants can be built with Yuba's well-known *Multilok Closure* to handle volatile fluids at 1200 F and pressures at 6000 psi and higher. Heat exchangers in lower pressure-temperature ranges, where leakage is not a problem, have standard bolted flange construction.

Yuba's ability to outfit a process or an entire plant with heat exchange equipment is one of its outstanding accomplishments. Yuba's design efficiency helps a petroleum or chemical plant to achieve maximum heat economy and, as a result, helps it to lower its manufacturing costs significantly.

Consult Yuba on your next heat exchanger order. You will find its East-West manufacturing and sales facilities very convenient.

YUBA CONSOLIDATED INDUSTRIES, INC.

*Divisions Manufacturing Heat Exchangers*

YUBA HEAT TRANSFER DIVISION, HONESDALE, PA.
CALIFORNIA STEEL PRODUCTS DIVISION, RICHMOND, CALIF.
ADSCO DIVISION, BUFFALO, N. Y.

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*Branch Offices and Representatives in Principal Cities*

# The SIE® Compressor Start Unit

## . . . makes full pipeline automation as close as tomorrow!

Start now to provide full automation of pipeline control systems by installing the SIE Compressor Start Unit . . . the basis of tomorrow's completely automatic, and today's semi-automatic, operations. *Right now* the SIE Compressor Start Unit offers these important advantages in daily operation:

- Realize greater throughput and increase employee efficiency by automating this vital phase of compressor station operation.
- Handle remote starting and receive immediate visual signals indicating compressor malfunction.
- Eliminate human error by handling entire compressor starting sequence automatically.
- Addition of an SIE Computer Controller will provide full compressor station automation.

Ask SIE for complete information on SIEMARC (SIE Monitoring and Remote Control) to learn how immediate installation of the Compressor Start Unit will advance the date of full automation of your pipeline system, and increase station efficiency in the meantime.

*Industrial Instrumentation for Industrial Progress*

SIE

**SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.**

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# Moore

# SUPER-KAY

**DERRICKS . . . . 100 MPH ACTUAL WIND LOAD CAPACITY WITH PIPE RACKED IN DERRICK. SINGLE AND MULTIPLE WELL ARRANGEMENTS.**

Substructures, engine foundations, pipe racks, and platforms for well logging equipment designed for most efficient application in Offshore Drilling Operations.

ADVANTAGES OF KAY TYPE BRACING

The "KAY" design of bracing provides exceptional rigidity, shorter members which make for easier erection.

The "KAY" bracing system resists a horizontal load by one brace in tension, and the other in compression, so that stress on the members is considerably lower than in orthodox bracing systems.

The shorter, more rigid members in "KAY" bracing lower the secondary stresses in the derrick. Also these shorter members are less liable to damage in transportation and handling.

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EXPORT OFFICE — ROOM 624, INTERNATIONAL BLDG., 630 5TH AVENUE, NEW YORK 20, N. Y. FOREIGN LICENSED MANUFACTURER — OIL WELL ENGINEERING CO., LTD., CHEADLE HEATH, STOCKPORT, ENGLAND

# They Say—

## Consultant likes cost study

Dear Sir:

Congratulations to Paul Reed and Gene Kinney on their estimable special report in the January 20 issue of the Journal (Pipeline Contractors' Costs, p. 105). It should prove useful and valuable to people in the industry. A cursory review indicates to me that the information is reliable.

It is believed that the table should have included figures for a tapered line—down to ¼ in. wall. My studies show that for large diameter lines, up to 30 in., the average wall thickness will be $\frac{7}{16}$ in. It is my belief also that the construction cost will be appreciably less for an average of $\frac{7}{16}$ in. than for ⅜ in.

It is my conviction that within a comparable range of diameters the total cost will not vary, with respect to each other, more than the ratio of the outside diameters.

William G. Heltzel
Consulting Engineer
Tulsa.

## Cost study is "one of best"

Dear Sir:

Your article on Pipeline Contractor's Costs appearing in the January 20, 1958, issue (p. 105) is one of the best I have seen in any publication pertaining to the field of cost engineering.

Your pipeline editors, Paul Reed and Gene Kinney, should be congratulated on their success in obtaining detailed information on not only methods but also actual costs of laying various sizes of pipelines. Many other people in our organization (Stearns-Roger) also had favorable comments on this article.

William R. Weinheimer
Arvada, Colo.

## Crude dumped in California

"The oil business at the present time is in economic difficulties. It is suffering from that common malady which afflicts so many of the industries of our country today—oversupply and mounting inventories.

"We have had this trouble before, but in a different form. We have had many periods of local overproduction, but always with a ready world market or an East Coast market into which


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# Winch Line Tail Chain®

***—the Registered Trade Mark name of ACCO's flexible end member for wire rope used on truck and tractor winch lines***

Proved best for operations which require its wrapping around machinery for lifting, loading, skidding or hauling.

Look for the ACCO tag when you buy. It identifies the genuine Winch Line Tail Chain.®

**Compare these features**

- Heat-treated chain
- High carbon steel links
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- Drop-forged hook of heat-treated alloy steel
- Sturdy design
- Narrow throat
- Safety point on hook
- Hook design prevents injury to wire rope
- Hook will not distort at breaking strength of rope

SIZES: ½", ⅝" and ¾", available in Accoloy X-weld or HC High Test; also, ⅞" and 1", available in Endweldur 125 or HC High Test. Length of 2 largest sizes, 24"; length of other sizes, 18" (length is exclusive of hook).

*Write our York, Pa., office for Bulletin*

...You need these fine ACCO products, too—

**WEED TRUCK CHAINS**
*—engineered for oil field use*

**ACCO BOOMER CHAINS**
*—meet rugged oil field conditions*

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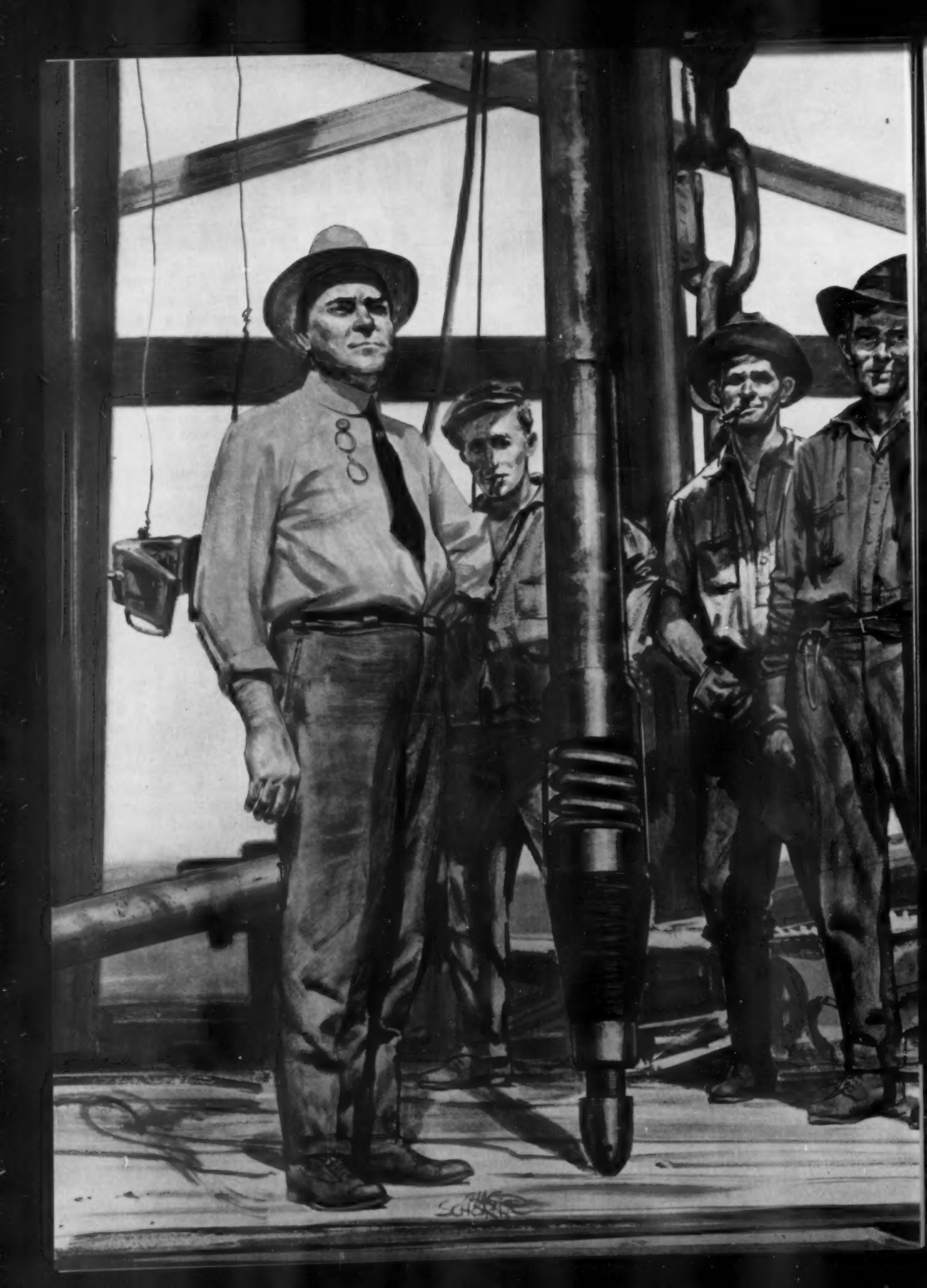
*Indicates Warehouse Stocks

ACCO TRADE MARK



## JUST OVER THIRTY YEARS AGO

El Dorado, Arkansas was booming. In progress was a drilling program, the size of which had seldom been seen until that time. More than an oil discovery was made at El Dorado for it was during that boom that the first Johnston Drill Stem Test was run. Since then, more than thirty years ago, over half a million drill stem tests have been run by Johnston personnel and with Johnston equipment.

No other similar service organization has accumulated such a wealth of experience.

A great number of problems had to be overcome in the early days of drill stem testing . . . equipment, test evaluation, and industry acceptance. The problems were overcome and drill stem testing was recognized as one of the most important precasing informational services available.

From the first, Johnston devoted practically all of its research and development effort to a single objective . . . the improvement of the testing tool design. With the best designed and workable equipment Johnston then perfected evaluation techniques.

Through the last thirty years Johnston has gained the priceless ingredient of real success . . . experience. There's no way of knowing just how many strings of pipe have been saved or the number of fields discovered since the Johnston brothers invented their first drill stem testing tool. All agree, however, that the industry has benefited greatly from Johnston's thirty years experience. Johnston equipment, methods, and personnel lead the field.

Remember that all drill stem tests are not alike . . . that Johnston will give you the best results, year in and year out.

Always call Johnston and be sure.

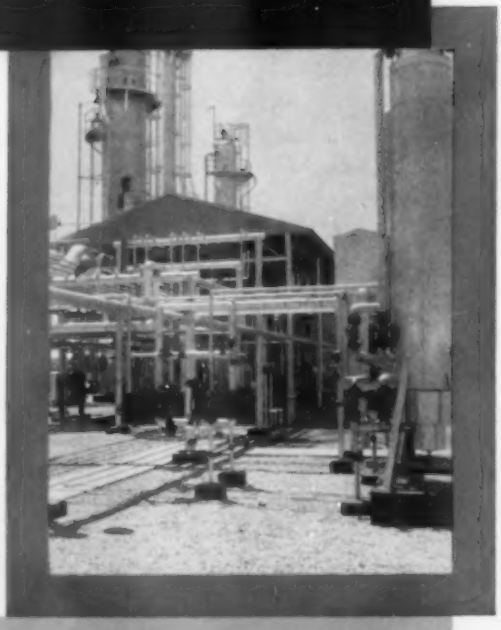
Johnston Testers, Inc., Houston, Texas; Long Beach, California; Calgary, Alberta, Canada.

A World Of Experience

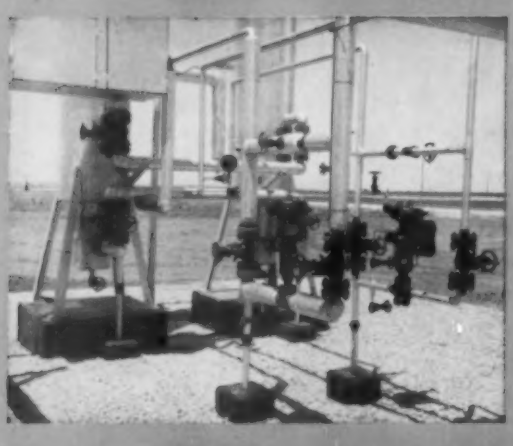
**JOHNSTON TESTERS**

# start using orbit

## forged steel asa class valves in your process area from formation to finished product



Right foreground, propane dehydrators. In background, plant process pump area.



ORBIT FORGED STEEL ASA CLASS VALVES IN SERVICE AT A KANSAS GASOLINE PLANT.

Propane dehydrators.

Product loadout pumps and storage area.

### advantages

No voids or cavities in body or bonnet where pressures can build up from trapped fluids when valve is either in open or closed position.

Non-lubricated, positive, friction-free closure which eliminates possibility of product contamination from valve lubricants.

Rising stem.

Adjustable, pliable stem packing.

All forged steel, vapor-tight construction.

ORBIT ASA CLASS VALVES are available in Carbon or Stainless Trim. Full Round Opening Sizes 1" thru 4". Ratings: 300 lbs. thru 2500 lbs. Flanged or Screw Ends. Venturi Opening Sizes 2" thru 6". Ratings: 150 lbs. thru 2500 lbs. Flanged End Only.

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**WEST COAST REPRESENTATIVE:** Fred P. Koenig Company, Long Beach, Calif., 3815 Atlantic Avenue, GArfield 4-3834

**CANADIAN REPRESENTATIVE:** T. R. Pickford & Company, Ltd., Calgary, Alberta, 536 8th Avenue West, Phone 2-7371

**EXPORT REPRESENTATIVE:** New York 36, N. Y., 500 Fifth Avenue, BRyant 9-2236

we could dispose of our surplus to relieve the local situation until the overproduction cleared up.

"Today we have a reversal of that situation, with the rest of the world in over-supply and the United States, and particularly California, as the dumping ground.

"In California we face the paradox of being about 200,000 bbl. a day short of our normal crude requirements from our own state production and at the same time having an excess of over 100,000 bbl. per day of excess crude oil on our hands."

*A. C. Rubel, president, Union Oil Co. of California, in a speech to the Bakersfield, Calif., Rotary Club.*

## Gas prices a real bargain

"I think far too few people—inside the industry and out—realize how much benefit has been passed on to the consumer in the way of product improvement and how little he has paid for it. The price of gasoline today is just about what it was 30 years ago, yet 2 gal. of today's gasoline will do what 3 gal. did then."

*J. G. Jordan, vice president, Shell Oil Co., in a speech to the Independent Oil Men's Association of New England.*

## Delta explains imports deal

"We looked all over those producing areas from which we could logically draw a source of supply trying to find the kind of crude that would produce in our plant products of such quality and kind as would permit the sale at a price that would yield a profit. This we were unable to do.

"We found a crude in Venezuela that permitted us to make the kind of products and also permit us to make a relatively small profit on our investment. We therefore contracted to buy 20,000 bbl. of such crude per day for the next 5 years.

"Having such a contract we assume obviates the necessity of completing the forms accompanying your letter."

*Delta Refining Co., in a letter to Capt. M. V. Carson, Jr., imports plan administrator.*

## Carson fixes responsibility

"It would be unwise and unrealistic to dismiss the possibilities of either increased tariffs or mandatory (import) controls. They are less desirable but also are the very real alternatives to our present voluntary effort. If the current program should fail because of noncompliance by certain companies or deliberate evasion of its

DON'T LET THIS HAPPEN TO YOUR TOOL JOINTS

This joint lost money for its owner because it was not properly doped. Properly made-up and lubricated with a WECO Tool Joint Compound zinc-base No-Gall or lead-base Lo-Tork, it would have been a money-maker.

WECO Compounds are made of 50% pure metallic lead or zinc dispersed in a neutral oil with a tacky additive. They always remain soft in the can under all extremes of hot or cold weather and never require thinning.

Low-friction make-up and positive resistance to squeezing out under pressure and high temperature make WECO Tool Joint Compounds perfect for every drilling program.

Add to the life of your drill string connections with WECO Compounds . . . No-Gall for those who prefer zinc base compounds; Lo-Tork for those who want a lead base compound. Your Supply Store carries complete stocks of both.

C-1-58

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

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Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

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*if valve failures are causing your*

# to excel in the long run

**oilmaster**

## TUNGSTEN CARBIDE SEATS and BALLS

Manufactured from sintered tungsten carbide, the hardest, most wear-resisting metal known to the industry. These seats and balls will not cut from fluid wash when subjected to extreme pressures—will not wear from the abrasive action of sand—will not hammer out from extreme fluid pound—will not pit from action of corrosive well fluid.

The Oilmaster tungsten carbide ball and tungsten carbide seat combination is the closest approach to a perfect pump valve that has ever been built. While it is not an indestructible valve unit, countless installations have proved that carbide valves consistently permit pumps operating under adverse conditions to run a year or longer, where other valves, regardless of the material used, almost invariably cut out in sixty or ninety days.

Compare the cost of pulling a well with the the cost of the finest seat and ball you can put in a pump. If the pulling cost looks high—specify Oilmaster Carbide seats and balls in all of your pumps.

**FLUID PACKED PUMP CO.**

*Main Office and Plant,*
*Los Nietos, California.*

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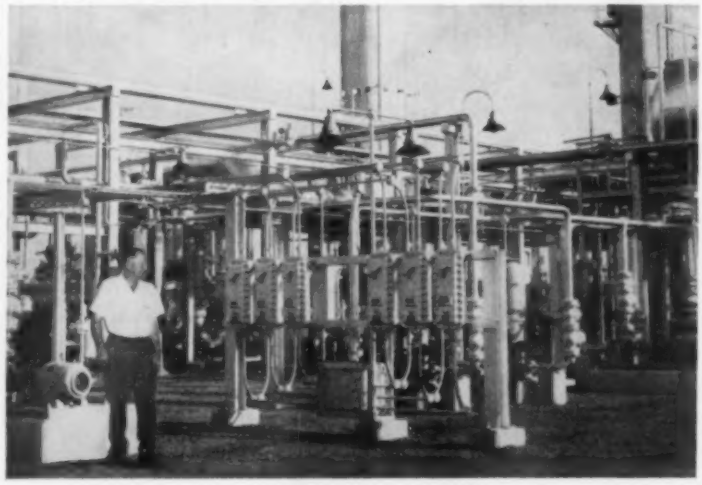
oilmaster PUMPS
FOREMOST IN THE INDUSTRY

*pulling jobs... specify Oilmaster Tungsten Carbide Seats and Balls*

# EASILY INSTALLED NELSON STARTERS SAVE FIELD TIME



A few of the many Nelson explosion-proof, combination starters used in the Sunray Mid-Continent natural gas plant at Redfish Bay, Texas.

Nelson explosion-proof combination starters are designed and built with the field man in mind. The starter comes fully assembled and wired, ready for quick easy installation.

If the cable pulling job is difficult only a few minutes are required to remove the four screws holding the pan mounted assembly. This leaves the whole enclosure available for cable pulling.

Nelson selects and uses only those components recognized for reliable trouble free performance, thus reducing maintenance to a minimum.

For Class I, Group D hazardous locations Nelson combination starters offer you the very best in safety, low installation cost, and minimum maintenance.

For more information on Nelson Combination Motor Starters write for Bulletins 420 and 1026.

OUR 20th YEAR

*a major source of electrical control equipment for industry*

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA


program, either tariffs or mandatory controls should result.

"I certainly hope that the executives of the firms whose actions may constitute an extreme threat to the success of the program are willing to bear the grave responsibility which the remainder of the industry will place on their shoulders in event increased tariffs or mandatory controls become necessary."

*Capt. M. V. Carson, Jr., imports plan administrator, in a speech to the New York Society of Petroleum Analysts.*

# CALENDAR

**FEBRUARY**

12-14 National Association of Corrosion Engineers, Tulsa section, ninth annual corrosion short course for pipeliners, Mayo Hotel, Tulsa.

13-15 National Society of Professional Engineers, spring meeting, Michigan State University, East Lansing, Mich.

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

20-22 Pipe Line Contractors' Association of Canada, annual convention, Empress Hotel, Victoria, B. C.

24-28 American Society of Civil Engineers, annual convention, Sherman Hotel, Chicago.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

**MARCH**

3-4 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fourth annual joint meeting of Rocky Mountain petroleum sections, Cosmopolitan Hotel, Denver.

5-6 Gas Conditioning conference, sponsored by the University of Oklahoma, Oklahoma Memorial Union Building, Norman, Okla.

7 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

7-8 American Association of Petroleum Geologists, Pacific Coast section, annual meeting, Ambassador Hotel, Los Angeles.

10-13 American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, forty-third annual meeting, Biltmore Hotel, Los Angeles.

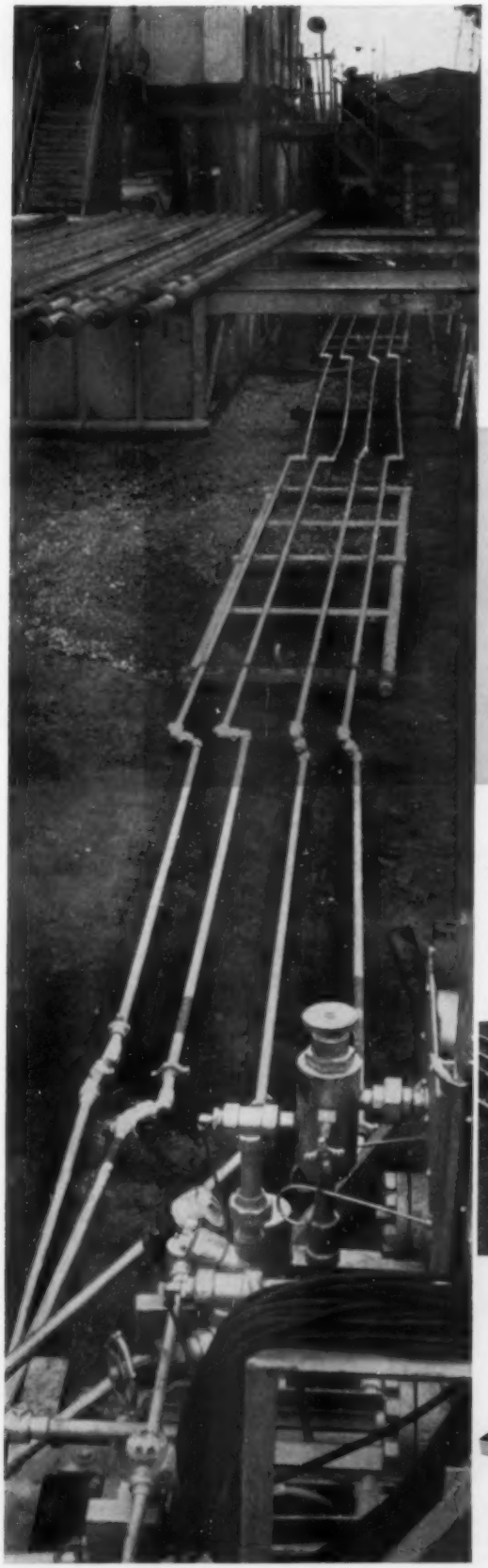
12-14 American Petroleum Institute, Division of Production, southwestern district meeting, Hotel Texas, Fort Worth.

17-21 National Association of Corrosion Engineers, annual conference, civic auditorium, San Francisco.

17-21 International Atomic Exposition, Inc., 1958 Nuclear Congress, Chicago Amphitheatre, Chicago.

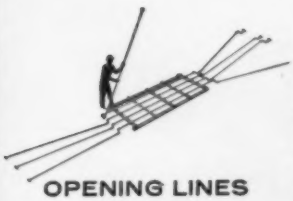
20-21 New England Gas Association, annual meeting Hotel Statler, Boston.

20-21 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, regional conference on production and



# SWIVEL JOINTED ACCUMULATOR LINES CUT HOOKUP TIME 75%

SPOTTING SLED



OPENING LINES

HOOKING UP UNIONS

*Situation:* Connecting hydraulic piping from accumulator to blowout preventer on this California rig used to take two men well over two hours. There were delays for rethreading damaged pipe and replacing worn fittings. And keeping lines free of dirt between breakdown and rigging-up was a problem.

*Solution:* Searching for a faster hookup method, the veteran toolpusher in charge of the rig drew upon his previous experience with Chiksan Swivel Joints. By combining a series of Chiksan Joints with rigid piping mounted on a sled, one man now completes the entire hookup in one hour.

*Benefits:* The operators estimated that the savings in time alone more than paid for the Swivel Joints in less than a year. In addition to rigging time saved, wear and tear on the piping itself has been considerably reduced. And with line pressures of 1500 psi and surges up to 2000 psi, the free-swiveling Chiksan Joints absorb pulsation and vibration eliminating downtime required to replace leaky pipe fittings.

*Where to buy:* Chiksan Swivel Joints are available at your nearby supply stores in a full range of styles and capacities to meet every oilfield need. If you would like a drawing of the preventer line hookup described above, please write Chiksan, Brea, California, for "Bulletin ACL-1."

**Free swiveling Chiksan Swivel Joints permit flexibility in positioning accumulator, absorb line pulsations and best of all, deliver years of service with only occasional maintenance.**

*Please Address Dept. 32*

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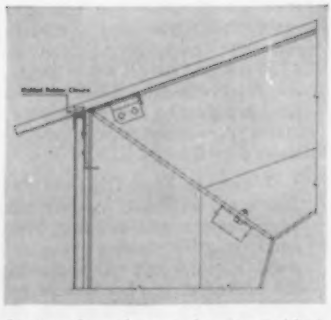
# TRUSCON
## "Budget Buildings"

## ...top utility at lowest cost



Section through eave showing molded rubber closure between siding sheet and roofing sheet. Also shown are eave strut and bracing connection to rigid frame.

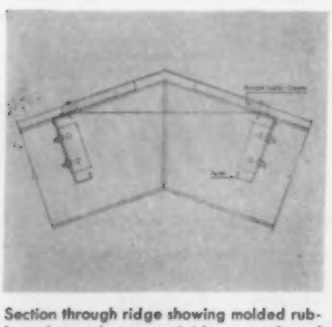
Here's ideal, low-cost, top-utility housing for oil field pump stations and compressor stations, refinery, bulk station operations. It's the new Truscon all steel "Budget Building."

Basic framework is of rigid frame design, shop fabricated from hot rolled structural sections, complete with connection plates and anchor bolts. Purlins and girts are cold formed channel sections.

Roofing and siding are 26-gage galvanized roll formed ribbed sheets, 24-inches wide and in continuous lengths. Sheets are rolled from Republic tight-coated, continuous hot dip galvanized steel . . . will not flake, peel or crack. No painting needed.

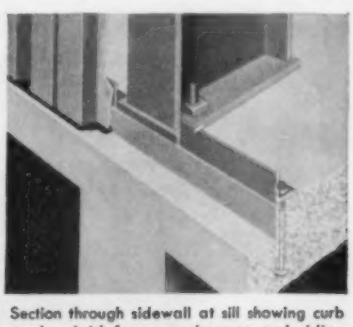
Truscon "Budget Buildings" are available for immediate delivery in widths of 32, 36, 40, 44 and 48 feet—12- and 14-foot heights, in any length necessary. Orders are filled fast from "off-the-shelf" stocks of pre-engineered materials. Roofing, siding, windows, doors and hardware are shipped to the job site as a package.

Learn more about Truscon "Budget Buildings". Send for full color brochure.



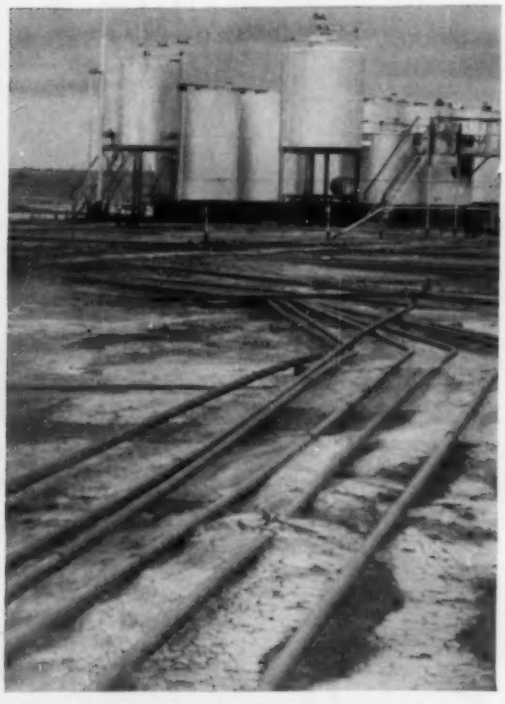
Section through ridge showing molded rubber closure between rigid cap and roof sheet. Also purlin connection to rigid frame. Connections make building weathertight.

Section through sidewall at girt showing girt connection to rigid frame and fastening of sidewall to girt. Strong, sturdy building can be erected fast at the job site.



Section through sidewall at sill showing curb angle, rigid frame anchorage and siding detail. All connection plates, connection bolts and anchor bolts furnished complete.

**REPUBLIC ALLOY STEELS** provide the oil field equipment builder a wide variety of analyses to produce lighter, more efficient designs with no sacrifice of strength or safety. Hardness resists abrasion; toughness and ductility resist impact and heavy loads. Ideal for bits, tongs, elevators, blocks, chain, sucker rods, draw work components. For more information, send coupon.



**REPUBLIC'S COMPLETE LINE OF PIPE PRODUCTS** range from continuous butt weld, shown above, to big diameter fusion weld line pipe. For data on sizes and types, mail coupon.

**REPUBLIC ELECTRUNITE® GROOVED-END TUBING** goes hand-in hand to serve your temporary, semi-permanent and permanent piping system needs. The combination of Republic ELECTRUNITE Light Weight Grooved-End Tubing and Victaulic "Vic-Easy" method of coupling saves installation time and reduces operating costs. Write today for attractive, illustrated brochure.

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New ... a powerful weed and grass killer prevents regrowth!

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You get Full Season's Control from One Application!

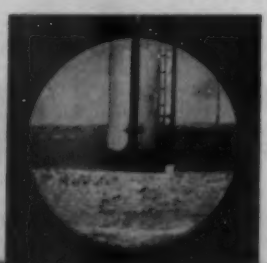
Only barren soil is safe from fire and other hazards! UREABOR destroys most all vegetation... for long periods. As little as 1 to 2 lbs. per 100 sq. ft. does this. Such low application rates mean savings on labor and storage space. UREABOR Weed Killer is always ready to use—DRY. Broadcast it by hand for spot treatments... use the handy new PCB Spreader for larger areas.

APPLY DRY

The new PCB Spreader is made for easy and efficient application of Ureabor. Available at $10.75—delivered—anywhere in the U.S.A.

Use UREABOR to destroy vegetation about fence lines, well sites, pipe lines, refinery buildings, heater units, tank batteries, and all places where ground must be kept bare.

Write for literature today!



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To ferrous metals

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MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

reservoir engineering, Mayo Hotel, Tulsa.

24-26 Midwest Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

24-26 Western Petroleum Refiners Association, annual meeting, Hilton Hotel, San Antonio, Tex.

26 Petroleum Equipment Suppliers Association, southwestern district meeting, Shamrock-Hilton Hotel, Houston.

27-29 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Southwest conference, St. Francis Hotel, San Francisco.

29 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

31-April 2 American Petroleum Institute, Division of Transportation, annual pipeline conference, Jung Hotel, New Orleans.

**APRIL**

1-3 University of Oklahoma, fifth annual conference on corrosion control, Extension Study Center, Norman, Okla.

2 Petroleum Equipment Suppliers Association, eastern district meeting, Duquesne Club, Pittsburgh.

9-11 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Biltmore Hotel, Oklahoma City.

13-18 American Chemical Society, national meeting, San Francisco.

15-17 University of Oklahoma, thirty-fourth annual gas measurement short course, North Campus, Norman, Okla.

16-18 Natural Gasoline Association of America, annual convention, Baker and Adolphus Hotels, Dallas.

16-18 National Petroleum Association, fifty-fifth semiannual meeting, Hotel Cleveland, Cleveland.

17 Petroleum Equipment Suppliers Association, Pacific district meeting, Beverly-Hilton Hotel, Los Angeles.

17-18 Texas Technological College, fifth annual West Texas oil lifting short course, Lubbock, Tex.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Louisiana-Arkansas, East Texas, and Mississippi petroleum sections, gas technology symposium, Shreveport, La.

17-18 Geophysical Society of Tulsa, Tulsa Geological Society, annual midwestern exploration meeting, Tulsa.

17-19 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Northwest regional conference, Spokane, Wash.

20-23 American Institute of Chemical Engineers and Chemical Institute of Canada, chemical engineering division; Canada-U.S. chemical engineering conference, Montreal.

21-23 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Cosmopolitan Hotel, Denver.

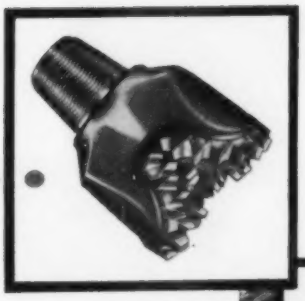
23-25 Second International Williston Basin Symposium, sponsored by Saskatchewan Geological Society and North Dakota Geological Society, Regina.

27-29 Independent Petroleum Association of America, midyear meeting, Hotel Sherman, Chicago.

27-30 American Association of Petroleum Geologists, Rocky Mountain section, Casper, Wyo.

28-29 University of Oklahoma, third annual conference on automatic control in the petroleum and chemical industries, Oklahoma Memorial Union Building, Norman, Okla.

# Bits...



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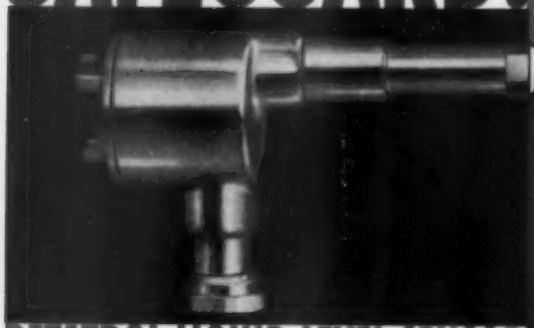

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*Betatrol—Tektor—Telstor... rugged field service measurement and control devices for the Petroleum Industry.*

**28-29** Independent Petroleum Association of America, mid-year meeting, Sherman Hotel, Chicago.
**28-30** Southern Gas Association, annual convention, Dallas.

**MAY**

**1** Petroleum Industry Electrical Association, Petroleum Electric Supply Association, annual joint meeting, Adolphus Hotel, Dallas.
**5-6** Society of Petroleum Engineers of A.I.M.E., North Texas section, secondary-recovery symposium, Wichita Falls, Tex.
**5-7** Purdue University, thirteenth annual industrial waste conference, Purdue Memorial Union Building, Lafayette, Ind.
**5-9** American Gas Association, distribution, production, and transmission conference, Roosevelt and Commodore Hotels, New York.
**7-9** American Petroleum Institute, Division of Production, eastern district meeting, Deshler-Hilton Hote', Columbus, Ohio.
**8-9** Texas Petroleum Research Committee, eleventh oil recovery conference, symposium on "A Century of Texas Oil, 1875-1975," University of Texas, Austin.
**11-14** Texas Independent Producers and Royalty Owners Association, annual membership meeting, San Antonio, Tex.
**12-14** Chemical Institute of Canada, National Research Council, eighth Canadian high polymer forum, Macdonald College, St. Anne de Bellevue, Quebec.
**12-14** Instrument Society of America, symposium of analysis instrumentation division, Shamrock Hilton Hotel, Houston.
**12-16** American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, Los Angeles.
**20-22** Pennsylvania Gas Association, annual meeting, Pocono Manor Inn, Pocono Manor, Pa.
**21-23** Rocky Mountain Oil and Gas Association, thirteenth annual convention, Cosmopolitan Hotel, Denver.
**21-23** American Petroleum Institute, Division of Marketing, midyear meeting, Roosevelt Hotel, New Orleans.
**22-23** American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.
**26-28** Chemical Institute of Canada, annual conference and exhibition, Royal York Hotel, Toronto.

**JUNE**

**2-4** Petroleum Electric Power Association, annual meeting Texas Hotel, Fort Worth.
**8-11** American Petroleum Institute, Division of Transportation, annual tanker conference, Greenbrier Hotel, White Sulphur Springs, W. Va.
**10-12** Appalachian Underground Corrosion Short Course, School of Mines, West Virginia University, Morgantown, W. Va.
**19** Pennsylvania Grade Crude Oil Association, annual meeting, Penhills Club, Bradford, Pa.
**23-25** Interstate Oil Compact Commission, midyear meeting, Hotel Utah, Sa't Lake City.
**22-28** American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, Boston.

**28-July**
**?** Petroleum Equipment Suppliers Association, twenty-third annual meeting, Chateau Frontenac, Quebec.

# With Magcobar on your well ...

## a bonus in engineering experience to cut your drilling costs

The Magcobar service engineer and the district engineer make certain that you are getting all the cost reducing advantages of a sound mud program. These two work as a team to see that you get the right products backed up by sound mud engineering.

The district engineer can speak with authority when working with you to plan a mud program. And this authority is grounded on long familiarity with the district and the knowledge of past well problems. His experience shows up in the most economical drilling program for your well.

You can expect from him the latest word on the newest developments from Magcobar. He is constantly studying the application of Magcobar products and of new techniques to district drilling problems. This information is yours for the asking.

The Magcobar district engineer is always on the go. One eye is kept on all the wells in his district; the other, on new techniques and new products being developed by Magcobar. Make certain that you get this extra bonus in engineering know-how on your next wells. Begin to plan with Magcobar now.

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# designed specifically for controlling weighted muds...

# The Dorr-Oliver ClayJector

Utilizing high centrifugal forces the Dorr-Oliver ClayJector — the most recent development for controlling weighted muds — provides a means for rejecting undesirable drilled solids and clays while minimizing barite losses from the mud system.

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Key to ClayJector efficiency is the DorrClone classifier, a cylindro-conical unit. Four of these units are manifolded radially about a common feed, overflow, and underflow housing. Any of the units can be cut out of service to meet variations in circulation requirements by means of quick opening joints and blank flanges.

For more information on the ClayJector, contact our U. S. Sales Representative, Salt Water Control, Inc., 1211 Fort Worth National Bank Building, Fort Worth 2, Texas.

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the OIL AND GAS JOURNAL

TULSA, OKLAHOMA

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Member
Audit Bureau of Circulations
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# JOURNALLY SPEAKING

## Circulation Circumlocution

THE MAN had a twinkle in his eye, so we weren't too worried about the blast we could tell he was building up to.

He started out with the most lavish praise for our favorite oil publication —"the best articles . . . the freshest news . . . the most important statistics . . . always a leader . . . " etc. etc. Our glibbest salesman couldn't have laid it on any thicker. We sat back wondering when he would get to the "but". Finally it came.

"But—doesn't the Journal's right hand know what its left hand is doing? Do you want new subscribers or don't you? How in the name of common sense can you explain your circulation policy?"

"What's your trouble, George?" we asked, though we had a good hunch.

"Look," said George. "My son was raised in the oil business but now he's in another business. But he wants to keep up with oil so he tries to subscribe to the Journal. But your damphool circulation manager sends back his money and says he can't subscribe because he's not in the oil business. Silliest thing I ever heard of. Now how . . ."

"Wait a minute, George. It's not silly at all. Practically every business magazine limits its circulation to people in its industry. You see, our subscription price doesn't begin to cover the cost of paper, printing, and postage. We make our money from selling advertising, and advertisers aren't at all interested in people who couldn't possibly influence the buying of oil equipment. For instance, you're in the oil business so you wouldn't be allowed to subscribe to a florist's magazine, or a textile magazine or a . . ."

"Okay, okay," George interrupted with the air of a man determined to fire the second barrel.

"That's the same line of stuff your circulation manager wrote me in answer to a hot letter I fired off to him about my son. I never heard of such a policy, but I'll accept it.

"But after all that, he adds that it's all you can do to print enough copies to take care of people in the oil business. How about that?"

"He's stretching it a little bit. But we have had to do a lot of humping to keep our production capacity ahead of demand. You see, the oil industry keeps growing steadily and we keep growing with it. We've more than doubled our circulation since the end of the war."

"So what? Any business that can't produce enough to meet its customers' demands must be a pretty sorry . . ."

"Hold it, George. We've bought five new presses and replaced four old ones with faster ones. And right now, in the new part of our building, we're installing a super-duper new press and a lot of other machinery to speed things up. We run our presses around the clock, but even so it's a race to keep ahead of our circulation growth."

"All right!" George pounded our desk and his eyes blazed as he rose from his chair to deliver his clincher.

"Then how about this? In the very same mail that I get this letter from your circulation manager turning down my son, I get a promotion letter from the very same circulation manager soliciting new subscriptions! And then I pick up my copy of the Journal and in there is a postcard order blank for new subscriptions!

"Now then: Do you want new subscribers or don't you? Do you call that consistent? Explain that if you can."

We could. At least we tried.

We do want new subscribers—provided they're in the oil industry. Our renewal rate is about 80 per cent, which means we have to keep adding about 20 per cent a year to offset deaths and retirements just to stay in the same place.

And we want to continue to grow as the industry grows, and we intend to keep on expanding our facilities so we can serve everybody in the industry. Every real oil man can get the Journal —always could and always will.

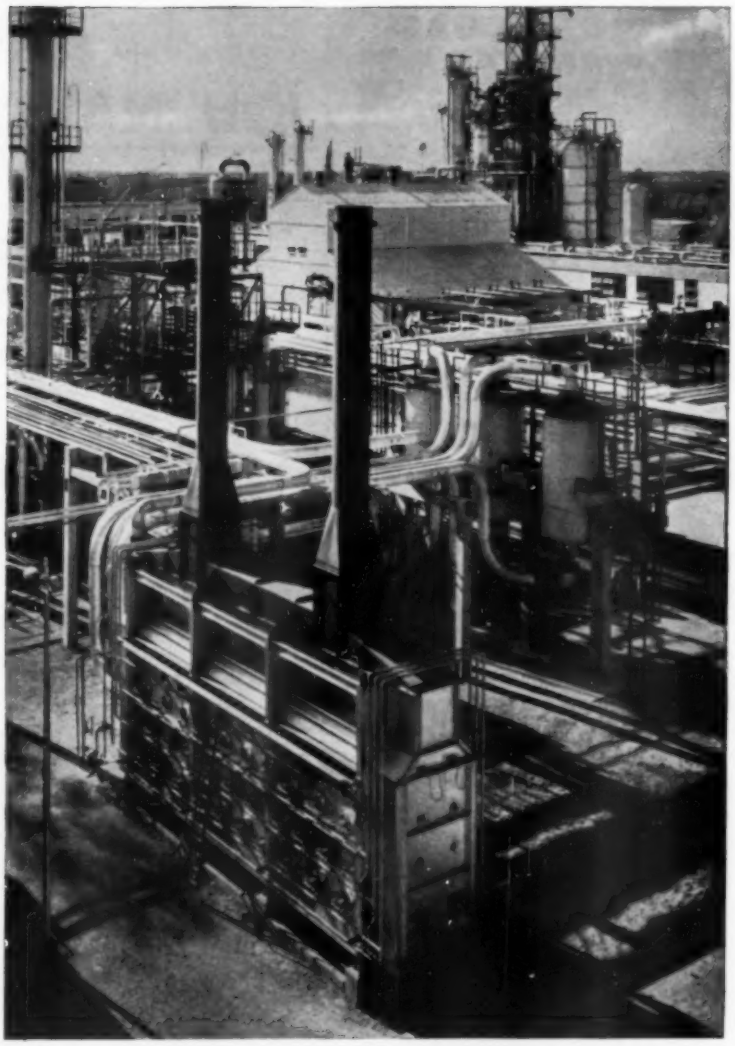
But we can't take subscriptions from people outside the oil industry because . . . oh this is where we came in.

*—Henry D. Ralph.*

*our research is your reward*

# Split-Second Response ... ±1°F Control in Catalytic Reforming at Imperial Oil Ltd.

## ...with Selas Gradiation® Heating



Rapid, precise heating is of utmost importance in this critical petroleum process. Where a 5°F variation in outlet temperature can adversely affect product octane by as much as one number, the value of Gradiation heating—providing ±1°F control—is obvious.

Selas Gradiation heaters are in service in most of the major catalytic reforming processes: in visbreaking, light hydrocarbon pyrolysis, in high temperature heating including cylindrical reactors.

In critical processing operations in the petroleum and petrochemical industries, Selas Gradiation heating provides:

- Preciseness of heating.
- Ability to handle a variety of feed stocks; for example: ethane, propane, ethane-propane mixtures including propylene—in one heater.
- Instant response to controller demand, achieving close equilibrium approach.
- Zone Control . . . up to 3 independent coils in the same heater.

Specially-engineered and custom-built to meet your specific processing needs, Gradiation tubular heaters are available both Selas-shop-assembled and field-erected. Selas also builds Econotherm* heaters for non-critical processing where low first cost is an important factor.

Send for Bulletin 82 "Gradiation Heating for Petroleum and Chemical Processing." Selas engineers will be glad to discuss your heat-processing requirements with you.

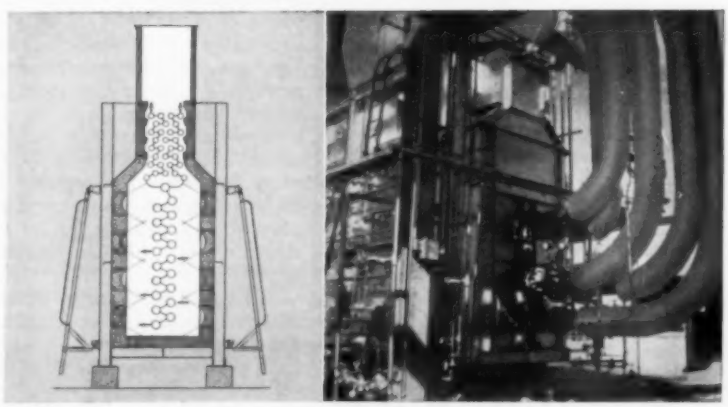


Diagram illustrates the flow of material through the multiple coils during preheat, first and second reheat cycles.

* Trade Name *Gradiation is a registered trade name of Selas Corporation of America.*

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*Heat and Fluid Processing Engineers*

**DEVELOPMENT • DESIGN • CONSTRUCTION**

# Time for a carrot instead of a stick

OIL producers in several southwestern states are resorting to various forms of litigation and legislation to force buyers to purchase more of their oil.

But in this period of high supply and low consumption, a carrot might move the donkey better than a stick.

Instead of hiring lawyers to prosecute and harass purchasers, producers might do better to hire some market analysts, salesmen, and good-will ambassadors.

TEXAS PRODUCERS are prosecuting a case before the Railroad Commission to force pipelines to lay gathering systems to unconnected wells which the pipelines say are uneconomic.

New Mexico producers have begun a study with the same end in view.

Oklahoma has gone even further. Spurred by producers, the Corporation Commission laid a heavy fine on Gulf Oil Corp. for engaging in pipeline proration. Despite legal disclaimers, this case was a patent attempt to force purchasers to take all oil offered regardless of need, and to punish Gulf for obtaining much of its supply outside the state.

While this case was pending, Gulf and another big purchaser sold their gathering systems and quit buying in Oklahoma. This certainly did not increase the market for Oklahoma crude. During the past few years several formerly big purchasers have virtually pulled out of the state, while those remaining, and still trying to find markets for Oklahoma crude, are treated as villains because they haven't done more.

Though the over-all demand for oil can't be stimulated, states that feel they aren't getting their fair share of it during this period of a "buyer's market" need these three things.

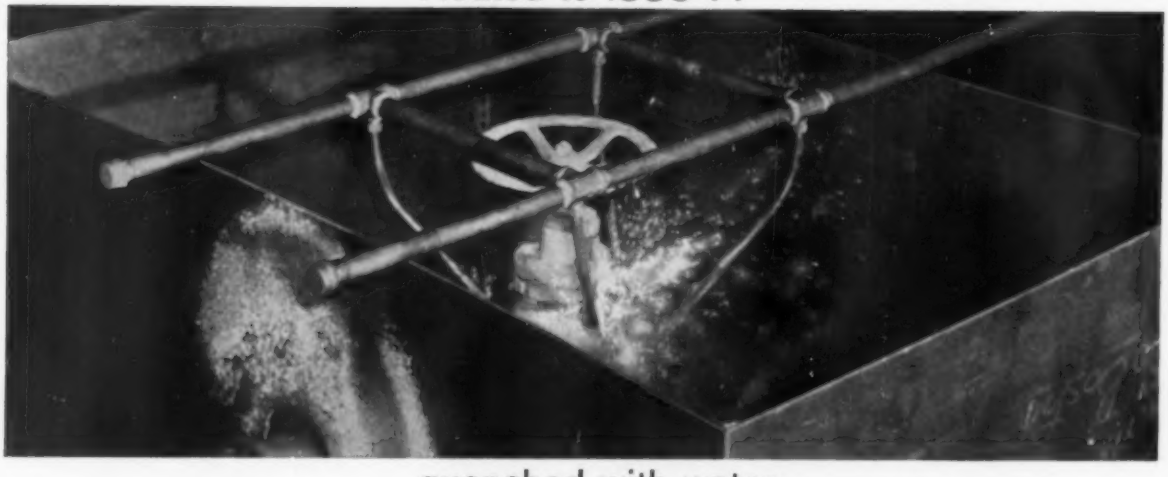
First, an economic analysis of what happened to former markets, why purchasers aren't eager to buy more, and what market each producing area can reasonably expect today. Blaming it all on imports is blind oversimplification. The Texas Mid-Continent Oil and Gas Association appears to be taking a first step in this direction.

Second, reexamination of state conservation procedures to keep output in line with actual markets and particularly to divide the reduced market equitably among all classes of wells and preserve correlative rights and ratable take. With today's low output there are inequities in the take whether or not purchasers are allowed to prorate.

THE GREATEST NEED is to substitute cooperation for pugnacity in seeking solutions, and to study the long-range effects of some of the short-term remedies.

The law may be on the side of producers in all these moves. But law won't make markets, nor will harassment and forced uneconomic expenditures woo buyers. You can catch more flies with molasses than with vinegar.

Heated to 1350°F.



...quenched with water

# Ductile iron valve withstands violent thermal shock

In a refinery fire, a valve might have to take the same treatment. Imagine what would happen if it shattered and opened the pipeline to flames?

**Ductile iron valves provide safety for refineries at low cost**

In the demonstration pictured above, the Walworth Company, manufacturers of valves and fittings, duplicated the conditions of a refinery blaze. To simulate stress exerted by expanding pipelines, they added heavy weights to the beams supporting the valve. And created additional stress by concentrating the oil and gas flame on one side of the valve.

When it reached a red-hot temperature of 1350°F, the valve was suddenly drenched with water.

Even after this severe test, the ductile iron valve retained its original shape and dimensions . . . showed a thermal shock safety factor *equal to more expensive steel valves!*

**Provides corrosion resistance, too.**

In tanker service, ductile iron valves alternately handle crude oil cargo and sea water ballast . . . experience to date predicts up to ten years service life.

Next time you specify valves – or any other equipment that demands the corrosion resistance of gray cast iron combined with the strength of carbon steel – consider ductile iron. See if it won't reduce maintenance costs for you in your own plant. It's easy to find out more about this practical metal. Simply write Inco for your copy of "Engineering Properties and Applications of Ductile Iron".

**THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street INCO New York 5, N. Y.

**ductile iron...the cast iron that can be twisted and bent.**

The OIL AND GAS JOURNAL

February 10, 1958

# Industry Watching New Price Moves

**Eastern States cuts West Texas sour crude 50 cents, but amount affected is small. Some refiners are cutting runs to bolster soft products market. Producers are concerned, but there's still confidence prices will hold.**

OIL PRODUCERS suffered a man-sized case of jitters last week.

A 50-cent cut in the going price for West Texas crude announced by Eastern States Petroleum & Chemical Corp. meant additional erosion of the general crude-oil price structure.

In view of a general oversupply of crude and a soft product market, the Eastern States announcement had oil men looking at their hole cards.

But companies still felt that, barring action by a major buyer, the basic crude-oil price structure would remain firm.

Eastern States' action affects only 6,000 bbl. daily, but it differed from other recent price adjustments. Other cuts—in the Tri-State area and the lower Gulf Coast—have been blamed on "local conditions." But Eastern States gave much broader reasons.

The company said low product prices and jet-fuel purchases in the Caribbean by the Government were responsible.

Eastern States is not, in itself, big enough to force the majors to meet the lower price. But the move pointed dramatically to the weak crude market.

The development was only one of several affecting prices and production last week:

**. . . Crown Central Petroleum Corp.** announced a 40 per cent cutback in purchases of crude from Pierce Junction field near Houston.

**. . . Sinclair Oil Corp.,** whose production is far less than its refinery demands, was reported studying closely its crude prices in Texas. Company officials said, however, they have called no meeting to consider a change.

**. . . Atlantic Refining Co.** cut its crude prices in three fields in the Upper Gulf Coast by 10 cents per barrel. Previous cuts by other companies had been confined to the Lower Gulf Coast.

**. . . Southwestern Oil & Refining Co.,** Corpus Christi, shut down a 38,000-bbl. unit in late January but prepared to put it back in partial operation over the weekend.

At Houston, L. F. McCollum, president of Continental Oil Co., said that refinery operators hold the key to the industry's problem of oversupply.

"Refinery operators hesitate to reduce runs because such reductions raise the unit cost of operations," McCollum said. "But this is the only solution to the current position of oversupply. There is nothing the petroleum industry can do to improve current levels of demand, which are not up to expectations.

"The industry can and should look at the present situation realistically and gear the supply of refined products to actual and not imaginary levels of demand. This is painful, but there is no alternative."

**Eastern States . . .** The position of Eastern States was stated by company president, R. B. Kahle. He said the 50-cent reduction "resulted from the continued reduction of petroleum product prices over the past several months at the Gulf Coast, which prices have further dropped severely during the past week."

Kahle also laid part of the blame at the door of the U. S. Government.

"One of the major contributing factors to the depressed petroleum products market is Government's purchase of substantial quantities of low-cost, tax-free petroleum products in the Caribbean area and the threat that such purchases will not only continue but will increase substantially," he said.

The new posted price of Eastern States is $2.40 per barrel for 34°-gravity West Texas sour crude oil. Previously the company bought on division order and did not post prices.

Eastern States' new price range for West Texas sour crude will start at $2.50 for 40° gravity and above. It will drop 2 cents per degree to a low of $2.32 for 30° gravity. Crude of 34°-gravity, the most abundant grade, will sell for $2.40, compared with a former price of $2.90.

Actually only about 6,000 bbl. per day is affected by the new price schedule of the company. The affected sour crude fields are scattered generally through West Texas, but the hardest hit is the Midland-Ector-Andrews area. Much of it is distress crude with no pipeline connection.

**Import issue . . .** The company presently is running 60,000 bbl. per day of crude at its Houston refinery. About half of this is West Texas crude, and some 27,000 bbl. is imported from the Persian Gulf area. A small amount comes from the Texas Gulf Coast.

The imports are sour crude—about 22,500 bbl. from Kuwait and 4,500 bbl. from the Neutral Zone. A company official said the Kuwait crude is acquired from British Petroleum Co., Ltd., under a "barter deal" in which Eastern States trades gas-oil "of American manufacture" for the imported crude.

American Independent Oil Co. provides the Neutral Zone crude.

Duncan Neblett, a senior vice president of Eastern States, said his company is importing about the same volume of crude as it did prior to the voluntary import control program, and the company is committed

by contract to take its present imports.

The import quota assigned Eastern States by Imports Administrator M. V. Carson is 18,300 bbl. per day. The actual December imports were 24,700 bbl. and January's 27,000. The company states its January-May imports this year will average 26,700 bbl.

Neblett said he had read that Carson had appealed to American Independent to revise its contract with Eastern States but "we're waiting on Captain Carson to notify us when he's ready to talk further about it."

**Crown Central . . .** Further evidence of softening of the Texas Gulf Coast and West Texas market was seen in Crown Central's decision to reduce its Pierce Junction purchases from about 15,000 bbl. daily to 9,000.

The company also has canceled orders for about 2,000 bbl. per day of West Texas crude moving through the Rancho Pipe Line System. The crude comes primarily from the Crane County area.

The reduction in purchases will be accompanied by a cutback in throughput at the 37,000-bbl. Pasadena, Tex., refinery near Houston.

**Sinclair's position . . .** What Sinclair does in the days ahead may very well direct the price trend in the Texas Gulf Coast and West Texas.

Sinclair buys 39,000 bbl. daily on the coast and 50,000 bbl. in West Texas and New Mexico.

The company is a much larger refiner than producer. Its domestic 1956 crude oil production, for example, averaged 124,723 bbl. per day, while its crude charging capacities for U. S. refineries averaged 453,000 bbl. per day.

W. C. Rhodes, a vice president of Sinclair Crude Oil Co., said he knows of no plan for Sinclair to follow Eastern States' lead.

"As far as the Tulsa office is concerned, we are not meeting to consider a price change and know of no plan to do so," Rhodes said.

**Atlantic Refining . . .** Atlantic Refining last week reduced its crude postings by 10 cents per barrel in the Barbers Hill, Cedar Bayou, and Jergins areas in the Upper Gulf Coast.

Atlantic officials said they don't expect the adjustment to touch off a general wave of price cutting. The affected crude, they say, can't be placed under either the old A or B Gulf grades but is equivalent in type and quality to that produced in the lower-priced Refugio area of the Lower Gulf Coast.

The new price for Barbers Hill and Cedar Bayou crudes is $3.41 per barrel for 34° gravity and above, compared with $3.51 previously. For Jergins crude of 40° gravity and above the price is $3.43.

Atlantic said it made the reductions to bring its prices into line with those paid for similar type crudes.

Republic Oil Refining Co. followed the downward trend in the Lower Gulf last week by whacking 20 cents off its prices for heavy Plymouth type crudes in San Patricio County.

**Williston . . .** Another phase of the crude market picture has developed in North Dakota and Montana, where distress Williston basin crude is being trucked to railheads and moved to Minnesota refineries by tank car.

The delivered price is some 75 cents under the normal delivered price of Mid-Continent crude.

Producers in some fields are getting as little as $1.95 for 40°-gravity crude, compared with the Illinois basin prices of $3 and $3.05.

And in the Illinois basin last week the double price standard showed new signs of settling at the $3 level. Ohio Oil Co., which had cut from the former price of $3.15 to only $3.05, dropped to the $3 figure to meet the price of the larger purchasers—Sohio Petroleum Co. and Ashland Oil & Refining Co.

# Condensate Price Cut

## . . . is posted by Atlantic Refining in Texas. Price may drop generally below crude prices because of lower demand.

THE OIL INDUSTRY may be moving toward posted—and lower—prices for condensate.

Crude buyers for several companies told The Journal last week they believe the time is coming, perhaps soon, when prices for condensate generally will fall below crude postings because demand for condensate has dropped.

Concrete evidence that such a trend is in the making came out of Texas where Atlantic Refining Co. announced that it is posting a price of $3.20 per bbl. in Gulf Coast and Southwest Texas areas. This is well below the posted crude price which Atlantic has been paying.

The chief crude buyer for one of the major companies operating in Texas said Atlantic's move "very definitely is part of a general trend."

"All condensate prices are coming down," he said.

The reason, he explained, is this: Condensate formerly was used largely for making jet fuel. The cutback of government purchases has softened the market, and condensate is hard as hell to find a home for right now." It simply doesn't have its former value and isn't worth as much as crude.

**The Champlin system . . .** In the industry generally, condensate has no separate posting but draws the same price as that posted for crude. However, there are some important exceptions on pricing.

In northwestern Oklahoma, for example, Champlin Oil & Refining Co. has been buying condensate for $1.03 under the posted crude price for many months. The Champlin price is $2.12 and the posted price $3.15.

Champlin buys about 10,000 bbl. per day of condensate in five counties.

"Condensate doesn't have the lubricating or other qualities we want in a crude oil," the Champlin spokesman said. "Economically, it just isn't worth as much."

Several buyers agreed that posting of condensate prices may develop generally in the industry. If it does, however, there will be a long period of adjustment before agreement is reached on a single schedule.

One crude buyer explained it this way: "When you have to put condensate through your crude lines and then separate it out at the other end, the loss is so great you lose your profit. But if you are equipped to handle condensate and can get it to your refinery, then it's worth more."

For this reason, it may be hard to settle on a single posted price.

**Other methods . . .** Gulf Oil Corp. has posted a $3.25 price for condensate in the Baxterville and Soso areas of Mississippi, but in these fields there is no comparable high-gravity crude.

In other areas crude buyers sometimes base their condensate price on the top price for crude—minus a specified amount, such as 10 or 20 cents.

Along the Gulf Coast the condensate market has long been soft. Formerly small purchasers would pay trucking costs where necessary, but the recent trend is to let the producers stand this expense.

On the upper coast, outside the area of recent crude price reductions, cuts of 20 cents per bbl. on condensate have been common.

# Memphis Review Due

**. . . as Supreme Court accepts FPC's appeal for a new look at this controversial ruling. Decision may come in June.**

VITAL QUESTIONS raised for the natural-gas pipelines by the Memphis decision may be answered within the next few months.

The Supreme Court last week agreed to review the decision of the District of Columbia Appeals Court. This decision scrapped the method by which the Federal Power Commission has dealt with pleas for rate increases for nearly 20 years.

The court accepted appeals from that decision filed by the Federal Power Commission, United Gas Pipeline Co. and Texas Gas Transmission Co. It packaged the three petitions and next month will set the date for the 2 hours of agrument which it allowed.

Requests of the Ohio Fuel Gas Co. and Natural Gas Pipeline Co. of America to take part in the case as friends of the court were denied.

Action in the case came after Solicitor General J. Lee Rankin asked the court to move quickly because of the great importance of the issues.

With the way paved for an early hearing, the court could hand down its opinion before the end of its term in June.

**What's involved . . .** The Memphis decision affects every gas pipeline in the country.

But the appeals court dealt only with issues presented by a rate increase filed by United in 1955. The application was suspended by the FPC for the 5 months allowed under the Natural Gas Act, then allowed them to go into effect subject to refund.

FPC action in the matter was challenged by Memphis Light, Gas & Water Division and Mississippi Valley Gas Co. They based their action on a Supreme Court decision that Mobile Gas Service Corp. could not file for an increase in a specific contract rate without acceptance by the customer.

The government and the pipelines contend that the two cases are not alike, since United has service agreements with its customers in which price terms are not given and the rates are to be those in effect at a particular time.

The lower court, however, held that pipeline companies cannot file rate increases with the FPC under Sec. 4 of the Natural Gas Act unless they have prior consent to specific new charges from every customer.

Lacking that approval, it said, the pipelines would have to seek an investigation under Sec. 5 to see if their rates are unjust and unreasonable (OGJ, Dec. 2, 1957, p. 70).

**Answers coming . . .** The Supreme Court review will settle 2 questions:

**. . . What is the proper method** to be followed by pipelines to secure rate increases?

**. . . Who gets** the more than $200 million collected by 23 pipelines subject to refund?

The wrong answer to these questions could ultimately cause the bankruptcy of an important part of the gas pipeline industry, FPC Chairman Jerome K. Kuykendall has warned.

The government and the pipelines contend that the appeals court ruling was an "unwarranted expansion" of the Mobile decision.

If allowed to stand, the government brief warned, it will undo years of work in the rate-review field, place an intolerable burden on the FPC, and adversely affect all pipelines which have recently received or have pending rate increases and seriously impair their financial ability.

# Positive Approach Is Better

**. . . in dealings with employes, Continental president tells management. Employers should be good listeners, too.**

THE PRESIDENT of Continental Oil Co. wants industry to put its cards on the table when discussing labor-management issues with employes.

L. F. McCollum told a Denver meeting of the Rocky Mountain Employers' Council that management should "take a firm position and tell them (the employes) where we stand on inflation, wages, unemployment, labor legislation, taxes, government control of business, and similar issues that affect their business and jobs."

"We should emphasize what we are for, rather than just what we are against. We need to discuss issues important to employes, even if they are controversial."

McCollum said employers must also listen attentively to what their employes have to say.

L. F. M'COLLUM
. . . "give them frank, honest answers."

"We have to give our employes an opportunity to express themselves to us, to ask questions, and to give them frank, honest answers.

"Employes are just as disturbed by the present world and domestic situation as are members of management. For the first time in several years they are worried about keeping their jobs.

"Already employes are hearing all kinds of prescriptions to cure the nation's economic ills and to help them individually. They are being bombarded from all sides with old and new ideas."

McCollum said wage and salary increases must be based on increased productivity to be shared by all segments of the company.

He said management, in talking with employes, should:

**. . . Always be truthful.**

**. . . Talk in terms** that interest the audience rather than in terms that please management.

**. . . Be affirmative** and aggressive rather than defensive.

**. . . Rely on personal contact,** supplemented by written communications.

McCollum said the discovery of a "few crooks and thugs in the labor movement" by recent investigations "doesn't give us a license to condemn the whole labor movement.

"The revelations of the McClellan committee require us to consider the conditions which permit that kind of skullduggery to continue," he said. "I hope that such investigations may bring about sane and corrective legislation, but it should not be punitive."

# Congress May Change Imports Plan

CONGRESS, the White House, and industry are lining up for the biennial hassle over imports.

The House ways and means committee will open hearings next week on extension of the Reciprocal Trade Act.

The fight over imports will be the main feature of the show and will occupy the committee and Congress for some months to come.

The fate of the voluntary oil import program will hinge on what the committee recommends to the House late in March or early in April.

The administration is pulling for a 5-year extension of the law, with authority for further cuts of 25 per cent in tariffs over that period. It is not considered likely it will get either.

A 1-year, or possibly 2-year continuance, with some material changes in handling excessive imports appears to be about as far as Congress will go.

The White House is trying to forestall formal import controls by offering to raise duties on imports. It would scrap the present clause allowing the President to increase duties up to 50 per cent of their January 1, 1945, level in such cases. An increase of as much as 50 per cent above the July 1, 1934, rates—in effect before any trade agreements were made—would be applied instead.

**Divergent views . . .** The idea is attractive to many industries which have felt the weight of excessive imports, but it is not attractive to the domestic oil industry.

Domestic producers point out that the highest import tax allowed under that formula would amount only to 31.5 cents per barrel on crude. That is not enough to keep out oil which now enjoys a price advantage of 50 cents a barrel or more, they say.

Several plans for dealing with oil imports may be offered to the committee during the hearings:

**. . . Independent Petroleum** Association of America wants to write the 1954 relationship between imports and domestic demand into the law. The IPAA plan would penalize imports in excess of quotas by a 30 per cent duty, or about $1 per barrel. Quotas would be set for both crude and products.

**. . . Other oil interests** may plead for a flat duty on all imports—about $1.15 per barrel. They believe this pocketbook approach would be more effective than quotas in keeping imports down.

**. . . Coal interests** will plug for a flat 10 per cent quota on crude, residual, and products. But they might go along with the IPAA plan, which would cover all imports.

**Independents split . . .** At a recent closed-door meeting of 19 producers' associations in Tulsa, there was little indication of a "united front" on a specific program.

Some operators favored IPAA's mandatory quotas and others held out for tariffs. Still others argued that the voluntary program hasn't had a fair enough trial, especially on the West Coast. The meeting resulted in:

**. . . Adoption of a resolution** commending the IPAA's policy in seeking mandatory controls, but carefully sidestepped the IPAA's specific "quota" recommendation. Delegates of six of the 19 associations declined to vote until their associations had more time to study the proposal.

**. . . Appointment of a liaison committee** composed of representatives from the associations to work toward a specific program and a united front.

The six associations which abstained from voting for the resolution included Oil Producers Agency of California, San Joaquin Valley Oil Producers Association, Kentucky Oil and Gas Association, Independent Oilmen and Landowners Association of North Dakota, American Association of Oilwell Drilling Contractors, and Illinois Oil and Gas Association.

One influencial member of IPAA's import-policy committee complained privately that the IPAA's mandatory quota recommendation was a "last resort" stand which would possibly result in a cleavage at a time when the industry can ill afford disunity.

He said the voluntary program,

**IPAA PRESIDENT** Gordon Simpson is uneasy about voluntary controls, pushes for mandatory quotas.

**TIPRO'S** president, Jerome J. O'Brien, holds out for tariffs as best solution.

**CALIFORNIANS** not voting at policy meeting: Walter Rowse (left) of San Joaquin Valley Oil Producers Association, and Stark Fox, Oil Producers Agency of California.

## Fourteen Will Seek New Import Quotas

### . . . in hearings starting this week in Washington.

All of these companies are asking for quotas for imports into East Coast and Gulf Coast ports. Seven other applicants have not said whether they want to be heard. But if they ask for hearings, they will be given them on some open date during the sessions. Interest in imports also is increasing on the West Coast. About a half-dozen notices of intent to import there have been filed. They will be heard next month.

Here's the hearing schedule for would-be East and Gulf Coast importers:

**February 10:** Falcon Petroleum Corp., Houston, and Delta Refining Co., Memphis.

**February 12:** Frontier Refining Co., Denver.

**Feburary 13:** Texas City Refining, Inc., Texas City, Tex.

**February 14:** United Refining Co., Warren, Pa.

**February 17:** Jenney Manufacturing Co., Boston; Clark Oil & Refining Corp., Milwaukee; Pure Oil Co., Chicago; Republic Oil Refining Co., Pittsburgh.

**February 18:** Bay Petroleum Corp. and Tennessee Gas Transmission Co., Houston; Ingram Oil & Refining Co., New Orleans; San Jacinto Petroleum Corp., New York.

**February 20:** Chemoil Corp., New Orleans, and Signal Oil & Gas Co., Los Angeles.

which went into effect east of the Rockies last summer and on the West Coast January 1, is working and that independent producers should "give it a chance."

The Texas Independent Producers and Royalty Owners Association voted in favor of the mandatory resolution, but stood pat on its stand for excise tariffs rather than quotas. This was reflected in the language of the resolution which said the "controls should include quotas, or excise taxes, or a combination of both."

Stark Fox, executive vice president of the Oil Producers agency of California, said his group abstained from voting for the resolution because the voluntary program hasn't been in effect long enough on the West Coast. He said there is "no indication of a breakdown in the voluntary program on the West Coast."

Gordon Simpson, IPAA president, told a press conference after the meeting that the move for mandatory controls was taken to strengthen "the commendable efforts" the Government has made in its voluntary control program.

The IPAA says its plan would reduce imports of crude to 765,000 bbl. daily, or about 225,000 bbl. below the 990,000 bbl. daily being imported under the voluntary control program.

Pending with the Government now are 21 applications by new importers for quotas under the voluntary plan (OGJ, Feb. 3, p. 51). These new requests add up to well over 200,000 bbl. crude per day.

The administration contends that the voluntary program is working out well. Interior Sec. Fred A. Seaton points out that in the program's first 6 months, imports were only 3.3 per cent over the recommended level. That can be made up in the current half-year, he says.

**New moves talked . . .** Government officials, meanwhile, are studying the import situation with a view to seeing where the control program can be strengthened.

Commerce Secretary Sinclair Weeks, chairman of the cabinet crude oil committee, and Treasury Secretary Robert B. Anderson met with top officials of some eight major importing companies in a series of talks last week.

Officials would not discuss the nature of the talks.

The large number of requests for quotas by companies wanting to import also has raised speculation that the cabinet committee may be studying the necessity for asking the major companies to "move over." The possibility of such action was foreseen in the cabinet committee report last July.

Fourteen applicants for quotas will defend their requests before Capt. M. V. Carson, Jr., program administrator, in a series of eight hearing days which starts this week (see schedule).

Carson disclosed that Central American Oil & Mining Co., Dallas, also has asked for information about securing a quota. The company, however, later said it did not want a public hearing now. If it goes through with plans to import, Carson was told, he will be advised 6 months in advance, as required under the program.

The companies which have not yet called for time are: International Oil Corp., Cambridge, Mass.; New England Petroleum Corp., New York; Superior Oil Co., Los Angeles; Southeastern Refineries, Augusta, Ga.; Martin Oil Service Co., Blue Island, Ill.. Danaho Refining Co., Houston, and Murphy Corp.

## Superior Makes Another Deal

INGRAM Oil & Refining Co. has negotiated with Superior Oil Co. for an undetermined volume of Venezuelan crude for processing in its Meraux, La., refinery.

An Ingram official said crude oil from Lake Maracaibo will largely displace South Louisiana supplies at its refinery if the company's request for an import quota is granted. The company's application is expected to be considered later this month by Capt. M. V. Carson, Jr., administrator of imports program.

J. A. O'Neill, Ingram vice president, indicated the purchase of Venezuelan crude is contingent on government approval.

The Ingram refinery, located just outside of New Orleans, has been shut down more than 2 months as result of a fire which destroyed seven storage tanks, damaged three others, and burned approximately 35,000 to 40,000 bbl. of petroleum products. The plant is expected to be back on stream in approximately a week.

Capacity of the Ingram refinery is rated at 15,000 to 20,000 bbl. daily. O'Neill said the company could get as much as 10,000 or 12,000 bbl. of Venezuelan crude daily under the arrangement with Superior Oil. However, he said the actual volume of crude to be involved was not definite.

O'Neill declined to reveal the price at which Venezuelan crude would be delivered to the Gulf Coast.

He emphasized that the decision to use foreign crude was not due entirely to the competitive setback resulting from the December 4 fire at the Ingram refinery.

"That's the only way we can stay in business," he said. In the past, he explained, the Ingram plant had processed only South Louisiana crude and distillate. He said that prices of refined products are lower now than they were before the price of domestic crude went up as much as 40 cents a barrel.

*Bull-session atmosphere is deliberately created at Arden House where . . .*

# Shell Runs Academy For Its Managers

**John P. O'Donnell**
**New York District Editor**

LIKE A FOOTBALL COACH, Shell Oil Co. is building a management bench with plenty of depth. Within a few years it may well boast one of the strongest management teams in the business.

Shell's latest approach to finding and developing its bosses is creation of a special management school. Four week sessions are held twice a year at Arden House, Harriman, N.Y. Each is attended by 30 men.

There's nothing new in a school for management. Nearly every large company has something of the sort. But what Shell attempts to do with its school is unusual.

Shell officials say the courses offered have three aims in teaching management personnel:

1. **Inside strategy.** This includes details of how Shell operates as an integrated company. Fifty per cent of the school's time is devoted to studying Shell's divisions, their relationships to each other and to outside groups.

2. **Outside strategy.** This involves a close study of the economic, social, and political forces which influence Shell managers. Twenty per cent of school time is devoted to these studies.

3. **Management technique.** The elements of modern management with special emphasis on how to work effectively with individuals and groups of people consume 30 per cent of the school time. (See opposite page).

**Hard planning . . .** The ambitious course adds up to a lot of ground to cover in 4 weeks.

But the goal is achieved—and apparently with success. The 116 men who have completed the course so far are enthusiastic about it. They all claim the benefits received make the study worthwhile.

Plenty of hard work and planning went into the project. In fact, 2 years of study by the Shell employe communications department preceded the first class.

This long study was undertaken to solve two problems: The college and university courses to which Shell sends managers did not have enough vacancies to handle all the men Shell wished to send. Also the company wanted a course emphasizing its own operations.

After surveying courses of other companies and those offered by universities, Shell decided to design its own school. The company further decided that top Shell management would act as instructors for part of the classes. Other classes would be taught by nationally known professors, journalists, economists, and businessmen.

**The course . . .** Basic design behind the whole course was to develop the greatest discussion among the students and between students and instructors.

Purpose of the course is set forth in a statement by H.S.M. Burns, Shell Oil president. It appears as the foreword in the course binder sent each student several weeks early and reads in part:

"This Shell management course is a form of selected training designed to help you develop yourself. Neither this course, nor any other course, can by itself make you a better manager.

"However, this course can be a valuable experience in your self-development to the extent that you:

"Participate actively in the discussions—speaking, listening, and thinking.

"Study the reading materials.

"Accept from and offer ideas to other participants and the instructors.

"Plan and carry out means to improve your management performance."

Several weeks before the students assemble at Arden House, they receive the binder in which Burns' foreword appears plus reading materials which they are expected to study before the course begins.

This material is augmented after they reach Arden House to make a formidable package of 57 pieces. The package includes several books on such subjects as economics and man-

# Shell's Managers Check Their Effectiveness with This List

BASIC MANAGERIAL functions and duties which apply to all managers are covered in this list. It is designed to help a manager spot his weak points and correct them. The list covers 11 major points that have from 4 to 20 subpoints.

**A. Planning**

1. Make effective use of your time.
2. Plan ahead on what the group should do.
3. Plan for personnel required.
4. Set realistic goals for the group.
5. Obtain group participation in setting goals.
6. Establish priorities for work.
7. Originate new approaches to problems.

**B. Organizing**

1. Understand your responsibility and authority.
2. See that each person understands his responsibility and authority.
3. Classify work to be done in orderly and productive fashion.
4. Show each person how he fits into the total picture.
5. Inform each person of what is expected of them.
6. See that the proper equipment and material are available.
7. Develop a climate to encourage individual and group creativity.

**C. Delegating**

1. Delegate responsibility and authority.
2. Concern yourself with a minimum of detail.
3. Avoid trespassing on responsibilities, once delegated.
4. Encourage each person to make decisions at lower levels.

**D. Initiating**

1. Recognize situations which need improvement and correct them.
2. Make the most of a promising plan or idea.
3. Get group reaction on imporant matters before going ahead.
4. Use suggestions from the group.
5. Encourage people to try new methods and ideas.

**E. Communicating: Receiving**

1. Encourage employes to express their ideas and criticisms.
2. Keep well informed about the accomplishments of the group.
3. Keep informed on how members think and feel about things.
4. Listen with understanding and purpose.

**F. Communicating: Giving**

1. Report progress to the group.
2. Keep the group informed of changes in policy and procedure.
3. Inform the group of activities of related departments.
4. Recognize good work and express appreciation.
5. Keep the group informed about matters affecting their work.
6. Explain the "why" of decisions.
7. Make effective use of group meetings.
8. Express yourself clearly orally and in writing.
9. Keep other levels of management properly informed.

**G. Relationship with others**

1. **Association**
   a. Demonstrate satisfaction with others.
   b. Make it pleasant to be a member of the team.
   c. Give personal attention to each person.
   d. Attend social events of the group.
   e. Participate in community activities.
   f. Maintain interest in the personal well-being of others.
2. **Cooperating**
   a. Encourage cooperation with members of other groups.
   b. Generate a sense of belonging.
   c. Encourage cooperation within one's own group.
   d. Go out of one's way to cooperate with others.
3. **Understanding**
   a. Understand employes' problems both on and off the job.
   b. Recognize off-the-job accomplishments of others.
   c. Adjust to personalities and circumstances in a tactful way.
4. **Supporting**
   a. Carry out policies enthusiastically.
   b. "Go to bat" for members of the group.
   c. Back up members in their actions.
   d. Back up your supervisor.
   e. Call attention to outstanding work of members of the group.

**H. Utilizing**

1. Inspire in others the willingness to work toward objectives.
2. Make full use of each member's abilities and skills.
3. Make effective use of time and equipment.
4. Deal objectively with problems and situations.
5. Handle employes' ideas and criticisms.

**I. Coordinating**

1. See that work is coordinated.
2. Define jobs to avoid overlaps and problems.
3. Provide information as needed.
4. Maintain a balance of interest between your group and the organization as a whole.
5. Help members of the group settle their own conflicts.
6. See that deadlines are met.

**J. Decision making**

1. Make decisions consistent with Shell policies and procedures.
2. Stay within the bounds of authority and responsibility in making decisions.
3. Consider all the important facts in solving a problem.
4. Consider the experience of others in reaching conclusions.
5. Accept responsibility for decisions even after consulting with others.
6. Make decisions promptly but not hastily.
7. Follow through after decisions to insure effective action.

**K. Measuring results**

1. Use systematic methods to measure performance, productivity, and progress of the group.
2. Develop realistic objectives and standards of performance.
3. Evaluate continually to readjust the organization and work standards.
4. Subject personal standards to a continuous review.
5. Emphasize accountability and the control of costs.

**L. Developing people**

1. Select properly qualified people for the jobs that have to be done.
2. Help new employes adjust to the job and to the group.
3. Provide opportunity for people to improve their skills and abilities.
4. Create in people a desire to do a better job.
5. Evaluate performance of people on a systematic basis.
6. Keep informed on how each group member is doing.
7. Recommend the best qualified people for promotion.
8. Maintain a personal program of physical and mental improvement.
9. Let people know where they stand and how they may improve.

agement, reprints from publications such as The Harvard Business Review, Fortune, The Management Review, and The Oil and Gas Journal, study outlines on the company and its divisions, and other material.

Headmasters for the school are F. W. Steckmest, manager of the employe communications department, and F. C. Cutting, assistant to the vice president, personnel and industrial relations. These men are assisted by others in the employe communications department who also serve as course staff members.

**The campus . . .** Students are billeted two to a room at Arden House.

Students representing different divisions and geographical locations room together so that one will get the benefit of the other's different experience and outlook.

Arden House was picked as the site for the school because of its facilities, location, and atmosphere. It is the palatial former estate of the Harriman family. It was given to its present owner, Columbia University, by New York Gov. W. Averell Harriman. Arden House is situated high in a densely wooded, isolated area of the Ramapo Mountains near Harriman, N.Y., 48 miles north of New York City.

**The students.** Shell has a reason for limiting each course to 30 students.

Management feels that a larger

group would prevent the informal, "bull session" atmosphere which it regards as essential to free discussion.

Each course also is limited to 4 weeks and only two a year are held for another good reason: Under this schedule Shell executives will be certain to have time to serve as instructors.

Students for each session usually come from all divisions of the Shell companies. Selection is made by vice presidents of each division. But one fact is stressed in selecting the students: Selection does not mean that the men necessarily are regarded as the most likely to succeed nor as the most in need of additional training.

Generally men are picked who have just entered or soon may enter a stage of management where their decisions may affect other divisions of the company. They range in age from the late thirties to early fifties.

**The teachers . . .** The courses and the teachers fit hand and glove.

About half of the time is devoted to studying Shell companies by divisions. Teachers are the top men in their respective companies and divisions. Reason for this time spent studying Shell is this belief: Managers should have a thorough knowledge of the companies, how one division relates to others, and how all divisions are interdependent.

Study of the various Shell companies is accomplished in terms of each division's objectives and functions; its management philosophy and policies; its procedures for accomplishing its objectives; and its relationships with other Shell organizations and outside groups.

Getting this message across is the job of the instructors. They include, besides Burns, such men as M. E. Spaght and A. J. Galloway, executive vice presidents of Shell Oil; R. C. McCurdy, president of Shell Chemical; Harold Gershinowitz, president of Shell Development; Joe T. Dickerson, president of Shell Pipe Line; and W. M. V. Ash, president of Shell Oil of Canada.

Each leads a 3 to 6-hour discussion in his field.

Since these executives lead discussions that may last up to 6 hours, they must be well prepared. The preparation they must make actually has paid off for them as well as for the students.

Burns in fact has observed: "I am not sure who has gained the most from this experience—the instructors or the students. Certainly every man who participated, be he teacher or student, was called upon to examine himself and his work most closely."

Among the outside experts this year were Raymond Moley of Newsweek; Luther Gulick, president of the Institute of Public Administration; Francis Bradshaw, past president, Society for the Advancement of Management; and Wayne Thompson, city manager of Oakland, Calif. Most of the remaining teachers are prominent professors of business administration from such schools as Columbia, M.I.T., Cornell, Illinois, and Harvard.

**Typical session . . .** The 1957 fall course is a typical one.

It began Sunday, November 10, and ended Friday, December 6. It ran 5 days a week with morning, afternoon, and several evening sessions.

Scheduled meeting hours were from 8:45 to 11:45 a.m. and from 2:15 to 5 p.m. Since the program has considerable variation, there was no chance for the students to become bored. Saturdays and Sundays were left free for study, relaxation, and personal affairs.

During the course, the students were divided into groups of five or six. Each group was assigned the task of drafting a statement of Shell's corporate character and philosophy of management. The assignment was designed to cover three basic points: Shell's objectives as a corporate enterprise; and things that distinguish its character, philosophy and policies; and what could be done to improve any aspect of Shell's business.

Chairmen of these groups later met and refined these drafts into a final text which served as the basis for Burns' discussion with the group at its last meeting.

The objective of the course is to help the potential executives help themselves. So to pinpoint his individual needs, each student must prepare a one or two-page plan for his further self-development as a manager. At the start of the course, each is supplied with a "personal check list of the managing process" for this purpose.

The company feels that, when it is completed, the individual has a pretty thorough idea of his strengths and weaknesses. It leaves him in a position to plan his own progress and review it through the next few years.

Shell President Burns sums up the company attitude toward the school and its benefits with one simple statement: "No matter what training aids are offered, the measure of a man is his performance on the job. That is where a man finally must develop and prove himself."

# Kansans May Revise Tax Law

## . . . on oil-gas production after high state court declares severance levy defective. Lawmakers study rewrite job.

KANSAS LEGISLATURE last week started the controversial job of rewriting the state's 1 per cent severance tax which was declared unconstitutional by the Kansas Supreme Court.

The court ruled the law's title was defective and therefore the entire law unconstitutional. The ruling meant a $4-million annual saving to the oil and gas industry in Kansas but at the same time knocked a hole in state revenue.

The decision came as the legislature was winding up its current budget session. The session is scheduled to adjourn later this week.

Attorney Gen. John Anderson said the legislature would have to enact an entirely new law. However, this actually will entail only rewriting the title to make it conform with the body of the law and then reenacting the measure. He said perhaps a few corrections also could be made to meet legal questions raised by opponents during the court case.

A revised measure was passed last week by committee and sent to the house floor. Chances of the bill's being pushed through this session were rated as only fair.

The court in a memorandum decision declared the subject of the act is not clearly expressed in the title and thus fails to comply with constitutional mandate. That being the case, the memorandum said, "other grounds of alleged invalidity becomes moot and require no discussion."

County attorneys of six Kansas oil counties had challenged the law. An attack on the law's title was only part of their case. The opponents claimed the law incorrectly included royalty owners as producers, was contrary to state law classifying property subject to tax, and by ambiguous wording violated constitutional provision of equal protection.

The test suit was filed by county attorneys in Wilson, Barton, McPherson, Stevens, Greenwood, and Russell counties. All are in western and central Kansas.

The tax went into effect last July

and in 6 months had yielded more than $2 million to the state. The 1 per cent levy covered both operating and royalty production at the wellhead, based on selling prices.

Meanwhile, prospects of oil and gas producers getting refunds on the taxes paid appeared dim. Most of the taxes were paid without protest. There's even doubt that the taxes paid under protest will be refunded, according to some oil observers.

Collection of the tax, however, was halted immediately.

## OCAW Wins Vote

### at Whiting refinery, but loses bid at Gulf research center.

THE OIL, Chemical, and Atomic Workers International Union is making a new effort to organize the 5,400 workers at the Whiting, Ind., refinery of Standard Oil Co. (Ind.).

The workers have been represented for several years by the Independent Petroleum Workers of America.

OCAW's hopes of invading the plant were bolstered when refinery employes attending the regular IPWA January meeting voted 800 to 9 for representation by the big AFL-CIO affiliate.

However, IPWA officers ignored a motion adopted at the meeting instructing them to meet the following day with OCAW officials to implement the affiliation, leaving OCAW with no apparent recourse.

OCAW conceded that IPWA's contract with Indiana Standard, which runs until March 21, 1959, probably would bar a National Labor Relations Board election to change bargaining representatives.

OCAW claimed there has been "considerable dissatisfaction with the independent union in the refinery because of its failure to act effectively in the face of severe layoffs that have taken place and are still scheduled."

The Whiting refinery workers settled for a 4 per cent wage increase in 1957 while OCAW gained 6 per cent.

**OCAW rejected . . .** OCAW lost a round recently when workers at Gulf Research & Development Co. voted 553 to 131 against joining OCAW. The plant at Harmarville, Pa., is the main research center for Gulf Oil Corp. and employs 1,500 persons, but only 693 workers were eligible for the NLRB election.

OCAW represents 5,000 of Gulf Oil Corp.'s 46,000 employes throughout the nation, with the largest concentration — about 4,000 — at Gulf's largest refinery at Port Arthur, Tex.

## watching WASHINGTON

**. . . with Bertram F. Linz**

### • Import cuts ruffle Venezuela, Canada

THE ADMINISTRATION'S FIGHT against putting import controls in the Reciprocal Trade Act may bank heavily on the reaction abroad to the voluntary oil program.

Talk of retaliation has been heard in both Canada and Venezuela.

Canadians say that if we won't take their oil they shouldn't take our goods. Canada is our most important export market.

The same view has been voiced in Venezuela, our No. 1 market ($1 billion a year) in Latin America. There are ideas, too, that the Government should have more control of foreign oil companies. But there is no threat that they will be tossed out of the country.

A lot of this is only wild talk as politicians jockey to fill the void created by the downfall of a dictator. But wild talk more than once has been the cause of wild action.

The administration believes it can calm the storm. But if the cuts are put in the Trade Act, it will be harder.

### • U. S. eyes nuclear sub tankers

THE NUCLEAR-POWERED submarine tanker may be the next big advance in ship construction.

Britain and Japan are reported already studying it. Russia probably is, also. This month, the U. S. entered the race.

The Maritime Administration has given General Dynamics Corp. a contract for a feasibility study of an underwater oil carrier. The company, a leading builder of Navy submarines, is expected to send in its report in about 6 months. The cost will be around $25,000.

Submarine oil movement is seen as offering several advantages.

It would be unaffected by surface wind and wave conditions, making for higher speed even in storms. In time of war, when present tankers would be sitting ducks, underwater carriers would have a better chance of making port.

The idea of a nuclear tanker has been knocking around for some time. But first thoughts leaned toward nuclear-powered dry-cargo ships. There is some belief now that a submarine tanker may lend itself better to atomic power, based on experience with Navy submarines.

### • Congress finds money for probes

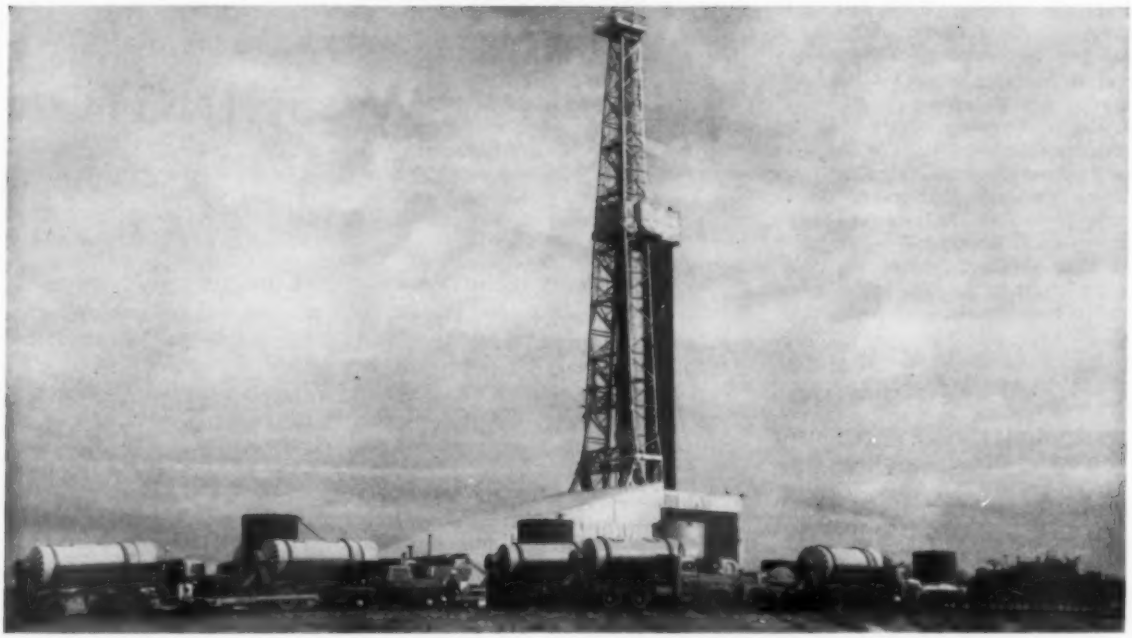
IT'S NOT VERY LIKELY that the economy-talking 1958 Congress will practice what it preaches.

Its leaders fully agree with President Eisenhower that some of the costs of our expanded missile effort should be offset by savings in other directions. But when it comes to practice, it's a different story.

In an election year it is hard to deny funds for education, small-business aid, and other things that may appeal to voters.

But it is a lot harder, anytime, to deny congressmen money to spend on probes which sometimes pay off in needed laws and sometimes only in headlines.

So, in 1 day, the House and Senate each earmarked $1 million for investigations. In the upper chamber, only Sen. Allen J. Ellender of Louisiana made a serious appeal for economy. The senators listened patiently, then voted the money.



**READY FOR BIG** cementing job at Oklahoma's candidate for world's deepest well is a fleet of Halliburton trucks, only part of which is shown here. Halliburton crews spent 3 hours and 9 minutes to get the plug on bottom at 7,898 ft. and used more than 5,000 sacks of cement in securing the 13⅜-in. casing.

# Record Casing String Is Cemented

**Howell & Howell plays cards carefully in early stages of its Anadarko Basin No. 1, the wildcat frankly aimed at a new world's depth record. Mammoth casing job just finished could be the first of many successes.**

DRILLING men are keeping an interested watch these days on an operation in Caddo County, Oklahoma, where Howell & Howell is out to set a world's depth record by putting a well down to 24,000 ft.

The wildcat, Anadarko Basin No. 1, is considered a good testing ground for deep-drilling equipment, tools, and techniques.

A special crew has just finished running a string of 13⅜-in. casing to 7,898 ft., the longest string of casing this large ever run. The heavy job was completed without trouble, the result of careful planning which has characterized early stages of the venture.

Howell & Howell is operator on the well, but its working-interest partners include Gulf Oil Corp., Tekoil Co., and Kenneth A. Ellison and associates.

**The drilling job . . .** Operators at Anadarko Basin No. 1 already are laying claim to some oil-industry records.

The first is the longest 17½-in. hole ever drilled. The second is the casing job.

Contractor carried the 17½-in. hole to 7,903-ft. depth before halting to run the record string of casing.

At the start, a 24-in. bit was used to drill surface hole. After setting 541 ft. of 20-in. casing for the surface string, operator switched to a 17¼-in. bit. A total of 52 bits have been used to date, running the bit bill to about $43,600.

During drilling operations, the crew has lost only 5 days fishing. On one of the numerous trips to the bottom, part of the surface string was knocked off. It was necessary to fish this piece of casing or casing protector out of the hole.

On another occasion, the crew lost the cutter from one of the reamers and this had to be recovered.

In drilling the 17½-in. hole, operator has been using a 5½-in. drill pipe with twenty-seven 7¾-in. drill collars. String reamers are run on the top two drill collars. A 17½-in. rubber stabilizer is positioned on top of the seventh drill collar.

The crew has been making about 100 ft. per day since the well was spudded November 10, 1957.

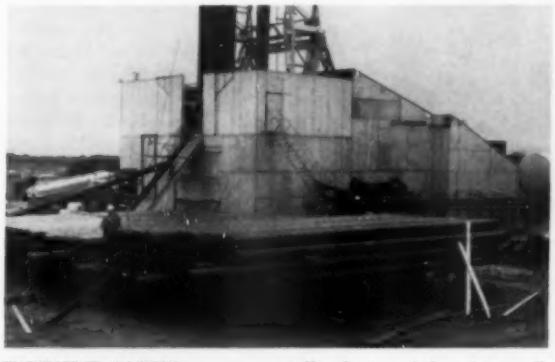
**Hole condition . . .** The contractor reported a dog leg and key seat just below the surface pipe.

This apparently gave the crew only a minor amount of trouble while running the 13⅜-in. casing. Once this zone was passed, getting to bottom was no problem.

Vernon Howell, one of the brothers who owns the company and is operating the well, reported that the hole was in excellent condition when they started to run casing.

Hole deviation below surface pipe presently is only one-half degree off the vertical from top to bottom.

**PUBLIC-RELATIONS JOB** is being done by operator at Anadarko Basin No. 1. The board above gives pertinent data on the well, current drilling depth, and picture of the formations. This keeps visitors well posted on what's going on.



**EXPENSIVE CASING** was especially designed for this well. It is N-80, Range 3, casing weighing 85 lb. per ft. and having joints averaging 41 ft. long. Cost ran $11.12 per ft. Note pains taken to protect rig from the weather.

**CONTRACT CASING CREW** handled the big string, and ran the 13⅜-in. casing without any difficulty. Hydraulic power tongs were used on the large pipe, size of which is shown clearly in this photo taken on rig floor during operations.

**Future plans . . .** The crew is now starting to narrow hole to 12 in. from the 17½-in. hole they carried to 7,903 ft.

Plans call for taking the 12-in. hole to 19,000 ft. At that time operator will set 9⅝-in. casing. Rather than run a full string of casing, crew probably will bring the 9⅝-in. up to 7,500 ft. and set it as a liner.

**The casing job . . .** Howell & Howell put much emphasis on getting a good casing job on the record string of 13⅜-in.

Here's what the firm did:

**. . . Employed a special contract crew** to handle the job.

**. . . Used the first set of hydraulic power tongs** ever designed for handling 13⅜-in. casing.

**. . . Borrowed a set of 300-ton elevators** to take care of the terrific hook load expected.

Getting the heavy elevators was no easy task. A set was not available in the Mid-Continent region. Finally Howell & Howell was able to borrow a set from Falcon Seaboard Drilling Co. and the equipment was brought to the Oklahoma location from Lafayette, La.

The casing itself was specially designed by Youngstown Sheet & Tube Co. for this deep well.

The operator ran 193 joints of this string.

**The cementing job . . .** Engineers did some pinpoint figuring and careful planning during the record 13⅜-in. casing operations. It paid dividends, too.

They estimated cement requirements, hook loads, and time required very close to actual. For instance:

**. . . Hook load** was estimated at just under 600,000 lb. The actual load was 570,000 lb., nearly capacity for the elevator.

**. . . Cement requirements** were estimated at 5,000 sacks. This was exceeded only because a switch in technique was made when cement failed to return to surface.

**. . . Time for the cementing** was put at 2½ hours to get the plug on bottom once cementing was begun. Actual time was 3 hours, 9 minutes.

The original plan called for circulating the cement to surface using 5,000 sacks. Engineers, however, realized that there was an excellent possibility that some of the formation would break down and start taking the cement. This actually happened.

Temperature survey showed top of the cement at 1,825 ft. below the surface. To insure a good cement job, the operator ran 1-in. pipe down the annulus between the surface casing and the 13⅜-in. Then he pumped in an additional 1,000 sacks in two stages and cemented to surface. This was a safety feature because operator wanted to be sure of a good seal between the surface pipe and the intermediate string.

# Standard (Ind.) Expands

## . . . into Eastern Hemisphere. New company headed by Chris Dohm to step up Indiana's search for foreign oil.

STANDARD OIL CO. (Ind.) is moving into the Eastern Hemisphere in its search for new reserves.

The company that sold out its interest in Near East Development Corp. to Jersey Standard 27 years ago to concentrate on domestic production is heading east of Suez again.

Only recently Indiana Standard returned to Latin America, which it deserted during the depression, and now it is spreading out—to the Middle East and perhaps Africa.

To run the Eastern Hemisphere operation, Indiana Standard has created Pan American International Oil Co. and hired C. F. Dohm, a man who knows his way around the oil world, to be its president.

Dohm formerly was president and director of Conorada Petroleum Corp., an overseas oil exploration subsidiary of Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp.

He was elected both president and director of Pan American International. In the Indiana Standard table of organization, International is a subsidiary of Pan American Petroleum Corp., which, in turn, is an Indiana Standard subsidiary. It was Pan American Petroleum's executive vice president, A. L. Solliday, who announced Dohm's election as president of International.

Dohm has had 20 years experience in foreign oil exploration and development since receiving his B.S. and M.S. degrees in petroleum geology from Louisiana State University. He worked for Jersey Standard and affiliates in Latin American countries from 1937 to 1949 and then returned to the U.S. as vice president of Conorada. In 1954 he became Conorada president.

Headquarters of the new Indiana Standard firm are in New York, and it will have at least one branch office in Europe. New York offices now are in the Ambassador Hotel.

Pan American International already is reported negotiating with Kuwait for an offshore concession. The company also is looking closely at Africa and Iran.

**The cycle . . .** Indiana Standard now completes the cycle with its new overseas outlook. Once a large investor abroad, the company turned its back on foreign areas in the early 1930's to concentrate on domestic production.

In 1931 it sold its one-sixth interest in Near East Development Corp. to Jersey Standard and the following year disposed of its Venezuelan, Mexican, and Aruban properties to Jersey.

C. F. DOHM
. . . picked by Indiana Standard

With millions in cash and $90 million worth of Jersey Standard stock, Indiana Standard turned to domestic exploration to produce crude for its big refinery and marketing operations. The company made big finds on the Texas Gulf Coast, East Texas, and West Texas. It also bought out producing companies.

Eventually Indiana Standard had the second largest domestic reserves in the U.S.—more than 2 billion barrels in 1956. Its daily average production hit 294,000 bbl. in 1956 and rose to 310,000 last year.

After World War II the company began looking abroad again and in 1948 obtained a concession in Colombia. However, the following year the company pulled out.

Then, several years later, Indiana Standard (through Pan American Petroleum) went abroad to stay—but only in Latin America at first. Today the company has a variety of holdings in Venezuela and in Cuba, although it has no production as yet.

The Venezuelan concessions are located in Lake Maracaibo, the Gulf of Paria, and the states of Barinas, Apure, and Monagas. The company owns concessions on 220,000 net acres.

In Cuba, the company is drilling three wells and could, under a number of deals, acquire one-half interest in 16 million acres.

Recently Indiana Standard pulled out of Jamaica after drilling several dry holes.

# Canadian Hearings

## on gas exports will begin; action encourages FPC.

CANADA'S POLICY on export of her natural gas may be firmed up in time for the Federal Power Commission to decide this year whether to let it come into this country.

The Borden commission, studying Canada's oil and gas problems, will make a start toward quick action on gas, with hearings to open this month.

The FPC, meanwhile, has indicated that its decision is several months off. Hearing in the Midwestern Gas Transmission Co. case, which involves plans to import Canadian gas, have ended. The various interests concerned in the fight over the big Midwest market have been given until March 24 to file their main briefs. They have until May 5 to reply to briefs.

More time will be needed for the trial examiner to write his interim report. Then the full commission will hear argument. It may be late next summer before final action is taken.

If the Borden commission makes recommendations to Prime Minister Diefenbaker within the next 6 months it might simplify things for the FPC. Lacking any idea of what Canada's export policy will be, it would be shooting into a void.

The speeding up of the commission's inquiry was welcomed in Washington. It promises an early end to the confusion resulting from the Diefenbaker government's refusal to honor Midwestern's purchase agreement without a new study of reserves.

But a general election which Diefenbaker called at the end of last month may also change the situation. He called the election to get an absolute majority in the Canadian parliament. Diefenbaker will have a good deal of opposition, but the result will depend on whether the voters think the present government has had a chance to prove itself and has failed, or needs more time.

## Movie-Lot Drilling Approved

LOS ANGELES' second movie-lot drilling operation received the go-ahead last week from the city council.

The council, by a vote of 11 to 1,

overrode Mayor Norris Poulson's veto of an ordinance creating an oil drilling district on the Paramount lot in the heart of Hollywood. Union Oil Co. of California has the Paramount lease.

Movie-lot drilling has chalked up one major success in Los Angeles. Universal Consolidated Oil Co. has been drilling for several years on the 20th Century Fox lot in West Los Angeles. At the 20th Century lot, there are 14 wells making more than 2,000 bbl. daily under severe choke restrictions.

## New TGT Pipeline

### being built off Louisiana to tap CATC West Delta area.

TENNESSEE GAS Transmission Co. is extending its offshore gathering system to pick up gas from three additional blocks off the coast of Louisiana.

The 10-mile section of underwater line will extend about 18 miles from the coast in the West Delta area of the Gulf of Mexico.

Commonwealth Oil Co. has started work on the project. The line is being laid by the "Magic," Commonwealth's barge designed especially for construction of offshore pipelines.

The extension will connect wells in West Delta Blocks 54, 58, and 59 with an existing TGT line to the mainland. Gas will come from fields developed by CATC Group, of which Continental Oil Co. is operator.

The new line will be 12¾-in. concrete-coated pipe. It is being laid in water approximately 55 ft. deep and buried in trenches 6 to 10 ft. deep.

Construction should be completed in 30 to 45 days.

### 100-Octane Gas Spreads

ETHYL CORP.'S monthly octane report shows a continued westward movement of 100-octane premium gasoline, although the weighted average for the nation remained the same in February as it was in January.

Ethyl's survey gave a weighted average of 98.4 research octane for premium and 91 for regular. The figure for regular was down .1 octane from January.

Compared with a year ago, premium was up a full octane and regular was up a half-octane.

Most significant development for February was the first appearance of 100-octane premium in Chicago and Midland, Tex. Previously only Toledo and Houston had the 100-octane outside the Northeast and East.

# Plight of Producers Studied

THE TEXAS Mid-Continent Oil and Gas Association last week launched a survey to determine just how much Texas oil is without a market.

The association will mail questionnaires to every producer of record in the state. The mailings began last week.

Producers are being asked to list all leases and wells which have no market through either pipeline or truck outlets.

The start of the market study was announced by Charles W. Alcorn, Houston, new president of the association, at a gathering of West Central Texas producers in Abilene.

Alcorn said it was necessary for the association to have more accurate information on the extent of the problem before it could help solve it.

**CHARLES W. ALCORN**

. . . Census for orphan wells.

**Concern growing . . .** This action by the Texas Mid-Continent, an association considered conservative and with membership made up of both major-company representatives and independents, points up the growing concern in the Southwest over the current oil-surplus situation.

Only the week before, a producer association in New Mexico began to gather data on unconnected wells as a possible prelude to a legal action to force connections in that state (O&GJ, Feb. 3, p. 50).

The association is the Independent Producers and Royalty Owners Association of New Mexico. Its attorney, Jack Campbell, estimates that the number of unconnected wells in the southeastern part of the state alone climbed 100 to 300 last year and now totals nearly 800.

He said the situation promises to become even more critical within a few weeks when a new crude line (Texas-New Mexico Pipe Line Co.) begins to carry Utah-Northwest New Mexico crude to Jal in the Southeast New Mexico area.

# Levy Plan Draws First Fire

OPPOSITION developed last week in Canada to a proposal to pipeline western Canadian crude to the Montreal refining market under a protective tariff.

President J. R. White of Imperial Oil, Ltd., declared in a Winnipeg address that such a plan would involve penalties for both the consumer of oil products in Eastern Canada and the producer of crude oil in Western Canada.

Such a plan was contained in a special study of Canadian oil markets made for Canadian independents by Walter J. Levy, New York consultant (OGJ, Feb. 3, p. 49).

Levy suggested a wellhead cut in western crude, reduced pipeline charges, and an import duty to make Canadian crude competitive with foreign crude in the Montreal market.

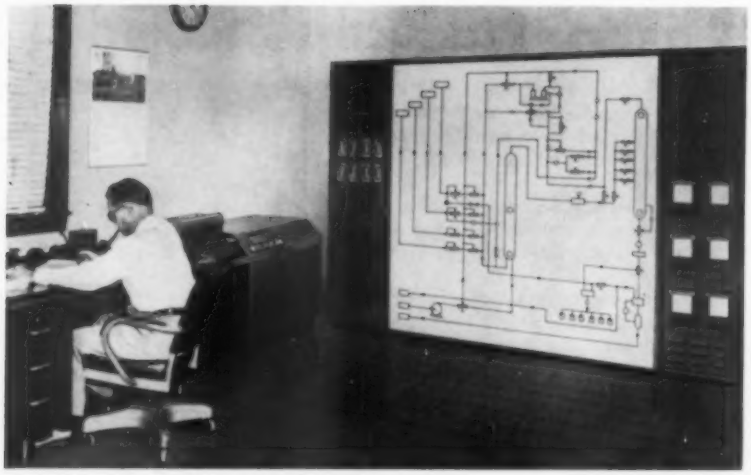
White, however, said such a step should be taken only if it is certain the U. S. Government will not "listen to the protests of Canada" and stop restricting movement of Canadian oil to natural markets in the U. S.

White also made these observations on the Levy proposal:

**. . . Chaining western crude prices** to the Montreal market might be dangerous. Western producers in the future may not want to sell at the Montreal prices, especially if more attractive markets should open up in the U. S.

**. . . Foreign suppliers** also may not stand still but also may cut their prices to retain the important Montreal market. Then the price gap would be maintained.

Under these conditions, White asked, who would be willing to meet the guarantees needed to finance a pipeline to Montreal, costing about $300 million?



**ROOM-SIZE PILOT PLANT** is latest tool for researchers of Esso Research & Engineering Co. To show its size an artist superimposed a drawing of the planned computer-controlled device onto a photo of an engineer's office at Esso's Linden, N. J., labs.

# Tiny Research Refinery

## . . . for Esso is achieved by using stream analyzers and electronic computer to make an automatic pilot plant.

OFFICIALS at Esso Research are enthusiastic about the possibilities of a computer-controlled pilot plant they will have within 6 months.

They believe it will give a shot in the arm to pilot-plant evaluations of both processes and catalysts. It will speed up research and save manpower, time, and money.

The new automatic system combines two tools which have been made available through developments in automation. They are continuous stream analyzers and electronic computers both for control and programing work.

Significance of the new Esso device is quickly apparent when one fact is considered: Figuring the economics of new processes or a new catalyst requires thousands of routine pilot-plant tests.

The payoff, then, on the automated, highly instrumented unit will come in accelerated research carried on with a higher degree of precision.

Savings could run into the millions of dollars by putting new techniques into commercial use earlier than is now possible.

**What it is . . .** In about 6 months the systems division of Consolidated Electrodynamics Corp. of Pasadena, Calif., will deliver the automatic miniature plant to Esso's research center at Linden, N. J.

If the unit lives up to its billing, Esso plans to apply the idea more widely to its research work.

Esso operates about 100 pilot plants. They range in daily charge capacity from one tablespoon to 100 bbl. The new control system will be applied to a pilot unit of intermediate size. It will be compact enough to fit into an average 10-by-20-ft. office.

The pilot plant proper will be a general purpose unit. It will comprise services for liquid and gaseous feeds and utilities, a reactor, and a product-recovery system. Thus it can evaluate a wide range of catalytic processes.

Other details:

The reactor system will be kept as simple and flexible as possible. It can be easily changed to suit the catalyst or process to be evaluated.

The product-recovery system will make an efficient $C_4$-$C_5$ split common to most pilot-plant operations.

Seven analyzers will be used in this first model. Two Consolidated vapor-liquid partition chromatographs will analyze all liquid hydrocarbons boiling up to 325° F. A third chromatograph will analyze the product-gas stream for hydrogen and hydrocarbons ranging from methane to pentane.

During regenerations, four additional analyzers will continuously determine oxygen, hydrogen, carbon dioxide, and water content. These instruments include a Hayes paramagnetic analyzer for oxygen, a Consolidated thermal-conductivity analyzer for hydrogen, a Mines Safety Appliances infrared analyzer for carbon dioxide, and a Consolidated moisture analyzer.

Several times a second these stream analyses, plus data on pressures, temperatures, flow rates, and other variables can be fed automatically into a computer which digests the data and prints it in final form.

**How it works . . .** When a test run is planned, an engineer will feed initial instructions into a desk-sized computer—a Royal McBee LGP-30.

This computer is programed to take over completely. It can conduct round-the-clock, automatic operation continuously for as long as several weeks.

The program is automatic in every sense. It includes a pressure test for leaks, also an oil cycle, regeneration cycle, catalyst-treating cycle, and finally a shutdown after a specified number of complete cycles. Throughout the test, conditions and stream analyses are monitored, controlled, and in some cases logged. Should any operating condition vary beyond pre-set limits, the computer will bring the unit down.

**What's the payoff? . . .** Esso expects to benefit in several ways by:

**. . . Reducing experimental error** in pilot-plant operations.

This system may cut the error factor to one-third its value with present equipment. If this develops, information of desired accuracy can be obtained with about one-ninth the number of runs now required.

Esso estimates conservatively it can cut runs at least in half if the system reduces experimental error by only 30 per cent.

**. . . Cutting length of runs.**

In running pilot-plant tests, operators generally are looking for one thing: What kind of product is coming out. By continuous digestion of analytical data, the new system can produce a running record on product composition.

It then becomes necessary to run the unit only until it comes to equilibrium. At that point, an accurate analysis is immediately available on the first fraction of a drop of liquid product.

It means that the run need not be extended to produce the several quarts of product often required for analysis by other methods.

This reduction of test runs from weeks to days has obvious advantages. It permits Esso to use the same pilot

plant to test many more catalysts under a wider range of variables.

**. . . Getting greater precision.**

By condensing runs to short periods, the researcher does not have to make large corrections for changes in catalyst activity. Short-term deactivation can be determined more accurately.

The net result is: An economical look at a catalyst or process, taken over a wider range of variables, and with optimum conditions defined with greater certainty.

**Effect on manpower . . .** One practical aspect of the computer-controlled pilot plant will be greater productivity from chemists and chemical engineers in the research center.

Freed from routine interpretations and computations, they will be able at least to double their rate of evaluations. And they can do so with greater accuracy.

This approach, if broadened, could net Esso millions of dollars in accelerated research. For example, getting one big commercial unit on stream a month ahead of schedule can mean savings of $250,000 or more.

## Sailors Lose Bid

### to organize offshore crews as NLRB vetoes election.

DRILLING IS DRILLING — on the uplands or offshore, for development or exploration—in the National Labor Relation Board's book.

The NLRB cited that position in turning down a petition of the Sailors Union of the Pacific. The union sought an election of Richfield Oil Corp. employes engaged in exploratory drilling off the California coast.

The offshore workers, who man a stationary barge and two supply ships, have been represented since 1956 by the Oil, Chemical, and Atomic Workers International Union.

The Sailors Union argued that there is a difference between upland and offshore drilling. The former is geared to money-making production, while the latter is keyed to geological testing.

The NLRB didn't agree with this argument. The same skills and equipment are needed for both land and sea drilling.

"The novelty of the location may require modifications in the personnel and equipment customary in land-based drilling, but the alterations induced by the geographic site do not sufficiently change the over-all function to classify it as a new undertaking," the NLRB decided.

## Processing briefs

**Tidewater Oil Co. had touched off** a new octane race on the West Coast. This week, Tidewater started selling the West's first premium gasoline with a 100-plus octane rating. This is two octane numbers higher than any premium motor fuel previously marketed in the western states.

In announcing the new gasoline in San Francisco last week, T. L. Wark said "Tidewater was able to offer the 100-octane fuel as the result of a multimillion dollar construction program recently completed at Avon refinery."

Service-station price of the new Flying A Super Extra will be 1 cent per gallon more than that of Tidewater's old top gasoline.

**The East Coast's first mined caverns** for storage of LPG will be completed this year at Esso Standard Oil Co.'s Bayway refinery at Linden, N. J. One cavern, capable of holding 300,000 bbl. of propane, is virtually completed. The other, which will hold 375,000 bbl. of butane, will be completed soon.

The shale caverns are being mined at a minimum depth of 300 ft. below the surface. Work began in October 1956. General contractor for the project is Fenis & Scisson, Inc., Tulsa.

**Wilshire Oil Co., California's largest** refining-marketing independent, has cut runs 8,000 bbl. daily at its Norwalk plant. This step was taken to reduce crude imports in compliance with the voluntary restrictions program. The 8,000 bbl. daily cut amounts to a 25 per cent reduction in refinery runs for Wilshire.

**Two new higher organic silicates** (2-ethylbutyl) silicate and terta (2-ethylhexyl) silicate, now being produced by Union Carbide Chemicals Co., can be used in compounding synthetic lubricants. They are characterized by a good heat stability, lubricity, and fluidity over a wide range of temperatures. They are also useful for formulating hydraulic fluids and as heat-transfer media.

**Sinclair Chemicals, Inc., is building** a 50-million-pound paraxylene plant at the Houston refinery of Sinclair Refining Co. Sinclair Chemicals is expected to become the world's biggest marketer of paraxylene when the new plant is completed. The company also is expanding paraxylene capacity at Marcus Hook.

The new plant also will produce 60 million gallons of pure toluene and xylenes annually. It is scheduled to go into operation early in 1959. Principal outlet for the paraxylene will be Du Pont's dimethylterephthalate plant now going up at Old Hickory, Tenn.

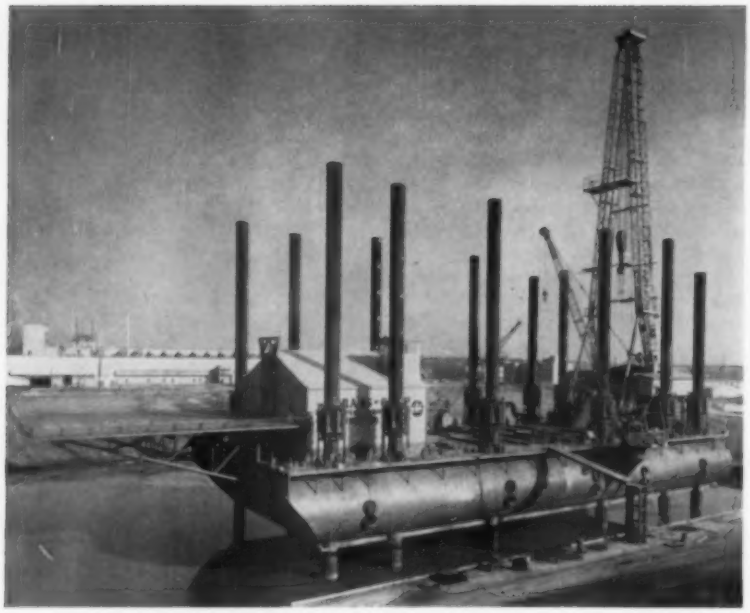
**A Massachusetts joint legislative** committee proposes to require oil companies to set standard tankwagon prices by zones, give dealers 24 hours notice of price changes, and put minimum octane ratings and manufacturers names on service-station pumps. Minority report says recommendations would mean "higher gasoline prices for Massachusetts" where prices, compared to other states, "are about consistently at the bottom of the list."

**Union Oil Co. has sold its shut**down 8,800-bbl. Maltha refinery at Bakersfield, Calif., to West Coast Asphalt Sales Co., Bakersfield. West Coast will manufacture road oils and asphalts. George R. Beggs, president of West Coast, said he expects to have the plant back in operation some time in March.

## *Also for Refiners . . .*

**IN THE NEWS:** Industry leaders have their eyes on new price moves after Eastern States cuts West Texas sour crude 50 cents. Some refiners are cutting runs to bolster soft products market (p. 65) . . . Atlantic Refining posts a cut in condensate price (p. 66) . . . The biennial hassle over imports is moving onto the Washington spotlight (p. 68) . . . Ingram Oil & Refining has negotiated deal with Superior for Venezuelan crude for its Louisiana refinery (p. 69) . . . OCAW wins confidence vote at Whiting refinery but loses bid at Gulf Research Center (p. 73) . . . Esso soon will have an automatically controlled pilot plant which will save time, cash, and manpower in research problems (p. 78) . . . Alberta is putting Athabasca prospecting permits up for bidding (p. 80) . . . Chinese Petroleum Co. plans to make avgas on Formosa (p. 85) . . . Cuban rebels boast they started Havana refinery fire in sabotage move against Batista (p. 86).

**PLUS THESE TECHNICAL REPORTS:** Price tags for seven methods of removing $CO_2$ (p. 93) . . . Petroleum coke becomes a finished product at Conoco's Lake Charles refinery (p. 115).



**NEW LOW-COST** drilling platform is ready for action as . . .

# Trans-Gulf Competes Offshore

ALONG THE GULF COAST, most operators would say this is no time to enter the drilling business—especially in the high-cost highly competitive offshore area.

But officials of Trans-Gulf Offshore Drilling Co. think otherwise.

This company, formed slightly more than a year ago, commissioned its first drilling platform last week. Although construction of the vessel started last winter, before the current slump in offshore drilling, it was designed for the day when offshore drilling would become highly competitive.

That day obviously has arrived. There are approximately 35 offshore rigs idle along the Gulf Coast.

Trans-Gulf is counting on the compact and economical design of its new unit to help the company compete with old-timers in the business. The unit is 185 ft. long, exclusive of the heliport, and 87 ft. wide, making it one of the smallest afloat for drilling in water depths of nearly 80 ft.

Cost of the vessel, complete with equipment, has been estimated at about $2,750,000, considerably less than many of the units now working.

The unit, an elevating deck type, was built by Port Houston Iron Works, Inc. The elevating mechanism on the legs was manufactured by Joe Stine, Inc., Houston.

A novelty of the new design is a mercury-switch level-control device. Compact design of the unit was made possible by installing most of the major equipment, other than the draw works, mast, and substructure, within the hull.

Drilling equipment is designed for 20,000 ft. or deeper. Major equipment includes an EMD diesel-electric powered IDECO E-2500 draw works and a 143-ft. IDECO Full-View mast with 30-ft. leg spread at the base.

President of Trans-Gulf is Drennan O. Wade, one of the owners and operators of Wade Towing Co. and Yount-Wade Drilling Co., Inc. Harry J. Chavanne, chairman of Trans-Gulf, formerly was a partner in Prince Drilling Co.

William H. Flynn, Trans-Gulf vice president, designed and supervised construction of the platform with the help of Dr. Wendell H. Nedderman. Dr. Nedderman, associate professor of civil engineering at Texas A. & M. College, also is a director of the new company.

## Utah to Build Road to Aneth

WORK IS SCHEDULED to start immediately on a new 23-mile highway to connect the remote Aneth oil-producing area in southeastern Utah to Utah State Highway 47 south of Blanding.

The much-needed road would go as far as the conflux of Montezuma Creek and San Juan River. A Utah official said oil companies have volunteered to spend $100,000 for a bridge spanning the San Juan. The Bureau of Indian Affairs has offered another $200,000.

The official said El Paso Natural Gas Co. has offered to contribute $175,000 and engineering work for the bridge, provided the company can hang two gas lines on the bridge.

## Athabasca Bidding

### scheduled next week. Interest in tar sands is running high.

JUST HOW valuable the oil industry considers the Athabasca tar sands of northeastern Alberta will be known February 18.

The Alberta government will take bids on that date for prospecting permits on 1,500,000 acres on both sides of the Athabasca River. The Athabasca bituminous sands contain an estimated 100 to 300 billion barrels of oil.

The land involved in the permit sale has not been previously filed on.

Interest in the big deposits increased last year with the announcement by Royalite Oil Co. that it has launched a $50-million project to take oil from sands by the Coulson centrifuge method (OGJ, Jan. 21, 1957, p. 66).

Since then another process also has been touted. Sonic Oil Separators, Ltd., has been organized to develop a process using high-frequency sound waves (OGJ, Dec. 23, 1957, p. 35).

The size of the permit bids on February 18 will indicate whether the industry believes one or both of the processes will produce oil from the sands at a profit.

Royalite has kept silent on results of its Coulson process, but there is some indication of success because the company made application, and was granted permission, to build a crude-oil pipeline from the oil sands to Edmonton.

Prior to announcement of the Royalite project, 26 companies had filed permit applications. But since then another 42 applications were made.

The government allowed filing of applications without bonus payments until the end of 1957. Now the government plans to sell rights on the remaining acreage for cash bonuses.

The new permits are basically short-term but may be extended at the discretion of the Crown. A company may take up to 50,000 acres in a single block. The permits may be converted to long-term leases when the company builds a plant.

## Big-Inch Looping

### is among expansions planned on Peoples' gas-line system.

A MAJOR EXPANSION, including looping most of the 1,400-mile Texas Illinois Natural Gas Pipeline Co. system, is planned by affiliates of a Chicago utility in the next 4 years.

Texas Illinois and Natural Gas Pipeline Co. of America, subsidiaries of Peoples Gas Light & Coke Co., plan to increase their combined capacities to 2,374,000 M.c.f. daily.

Mark V. Burlingame, executive vice president of the transmission companies, disclosed details of plans to supply growing demands of the Midwest.

The biggest single new project in a series of pipeline and horsepower additions is 860 miles of 30-in. loop in Texas Illinois. It is planned for 1960-61. Some 236,000 tons of pipe have been ordered. The looping will increase capacity of the line by 300,000 M.c.f. daily.

Other projects scheduled ahead of the big Texas Illinois expansion are:

**. . . 485,000 M.c.f. daily** in increased capacity for the 1958-59 heating season through the Beatrice project. Natural Gas Pipeline, Colorado Interstate Gas Co., and Pacific Northwest Pipeline Corp. will spend $182,000,000 on facilities to deliver gas from the Rocky Mountains and the Oklahoma-Texas panhandle areas.

The Beatrice project, already approved by a Federal Power Commission examiner, is expected to receive full FPC certification soon. The project has been deferred because of difficulties in financing arising from the Memphis decision. However Natural Gas Pipeline reports progress in negotiations with utility customers toward advance agreement on rates as required by rules spelled out in the Memphis case.

**. . . 185,000 M.c.f. daily** by the winter of 1959-60, at a cost of $63,000,000, involving several hundred miles of looping on the Natural Gas Pipeline system. This program is on file with FPC but has not yet been set for hearing.

**. . . 20,000 M.c.f. daily** in increased capacity is to be added to Texas Illinois this year, bringing deliverability of the system to 524,000 M.c.f. daily. Expansion will be accomplished through installation of another 2,000-hp. compressor engine and all but three of the existing stations. This will cost $4,400,000.

During the past year Natural Gas Pipeline added significant new supplies to its system by building the 350-mile, 20-in. and 26-in. line from Bridgeport, Tex., to Fritch, Tex.

## Pipeline briefs

**Humble Pipe Line Co. is seeking** permission from the Texas Railroad Commission to use positive-displacement meters to measure oil it takes from Sun Oil Co.'s production in the Southwest Red Fish Reef fields of Chambers County on the Gulf Coast. The installation would be similar to that already operated by Humble Pipe Line at Anahuac field.

The company would install the metering equipment at a Sun tank battery at San Leon, Tex. The meter would be temperature - compensated, and a proving tank would be used to prove the meter tickets. Humble said it normally uses the prover tanks to check operation of its meters about once a month.

**Forest Pipeline Corp., subsidiary of** Forest Oil Corp., has completed a 35-mile 8-in. pipeline to transport high pourpoint crude from Grieve Unit field in Natrona County, Wyoming, to Platte Pipe Line near Casper. Sterling Construction Co., Sterling, Colo., had the contract for the line, which will move 5,000 to 10,000 bbl. of crude daily. Line fill has begun. Grieve has produced 2,657,000 bbl. since its discovery in 1954, with the output being hauled to Platte by truck.

**Northern Illinois Gas Co., which** spent $18,500,000 for construction in 1957, has budgeted $22,300,000 for new facilities this year. Northern Illinois' projected 5-year budget for construction during 1958-62 is $125,000,000. About one-fourth of this amount is set aside for development of underground storage should suitable structures be located in northern Illinois.

**The Canadian Pipe Line Constructors** Association will hear an address on "Oil and Nuclear Fission—A Forward Look," by Gen. James Doolittle, Shell Oil Co., at the pipeliners' convention which opens in Victoria, B. C., February 20. Nuclear development in Canada will be discussed by Dr. W. M. Campbell, director of the chemistry and metallurgy division of Atomic Energy of Canada, Ltd., Chalk River, Ont. Another speaker will be J. Lance Rumble, of General Motors Products of Canada.

**Trans-Canada Pipe Lines, Ltd., has** reached its goal of bringing gas service this winter to Fort William and Port Arthur at the head of Lake Superior. Construction of this section, from the Alberta-Saskatchewan border to the lakehead, was completed early this winter.

Trans-Canada is delivering Alberta gas to Saskatchewan Power Corp. at Regina and Valjean, Sask.; to Winnipeg, Brandon, Rivers, Portage La Prairie, Neepawa, Hamiota, and Steinbach, Man.; Kenora and the Lakehead cities in Ontario.

The Toronto-Montreal section, completed last year, is being supplied by gas on loan from Union Gas Co. of Canada, Ltd., pending completion this fall of the 853-mile Ontario gap. Then the entire 2,250-mile system will be supplied by Alberta gas.

**Humble Pipe Line Co. will start** construction this month on a 90-mile, 16-in. crude line between Hawley, in Jones County, West Central Texas, eastward to Comyn, in Comanche County. Construction contract has been let to O. R. Burden Construction Corp., Tulsa, which will probably set up project headquarters at Cisco. The job will be handled by a spread which recently completed a looping project in the same area for Magnolia Pipe Line Co. The new line, located on Humble's Panhandle-Gulf Coast system, will have capacity of 99,000 bbl. per day.

## *Also for Pipeliners . . .*

**IN THE NEWS:** Supreme Court has accepted FPC's appeal for an early review of the Memphis Case (p. 67) . . . With Borden Commission hearings set for this month, Canada's policy on export of natural gas may be cleared up soon (p. 76) . . . TGT expands its natural-gas gathering system off the Louisiana coast. Plight of unconnected Texas wells is subject of study by Texas Mid-Continent Oil and Gas Association. Proposal to pipeline western Canadian crude to Montreal refining center draws first fire (p. 77) . . . Looping of most of the 1,400-mile Texas Illinois Natural Gas pipeline is planned (p. 81) . . .

**PLUS THESE TECHNICAL REPORTS:** Dual-purpose pipeline handles ethylene (p. 100) . . . Insulation on steam-carrying pipeline results in big saving for Esso Standard (p. 131).

# Vast Liquefied Gas Markets

## . . . will be tapped by Constock after experimental cargo reaches England. New plants and tanker fleet planned.

CONSTOCK LIQUID METHANE Corp. is thinking of a vast world market for its idea of liquefying natural gas for ocean movement.

The company said last week it plans to sell large volumes "in many undeveloped areas of the world" soon after it completes its experimental shipments to England late this year (OGJ, Dec. 16, p. 59).

It is already planning to build liquefaction plants in several areas where natural gas is abundant. It is also considering designs for special large tankers which would move the gas to distant areas now depending on high-cost fuels.

Constock is a 50-50 venture of Continental Oil Co. and the Chicago Stockyards. Alabama Dry Dock & Shipbuilding Co. is now converting at Mobile, Ala., a vessel which will haul the first experimental cargo to England. The ship is expected to be completed and to make its maiden voyage with 2,000 tons of liquid methane before the end of this year.

In London last week Sir Harold Smith, chairman of the British Gas Council, said if the experiment is successful "it is hoped that the way will be open . . . to the importation of liquefied natural gas in bulk."

The United Kingdom has a $2 million investment in Constock's first methane "tanker" and is spending $1 million on storage and pipeline facilities in Britain.

In New York, Constock President E. F. Battson and the Chicago Stockyards head, William Wood Prince, jointly announced plans to move the initial cargo of liquefied methane.

Battson indicated the scope of the operation the company is now contemplating.

"After trial runs of the experimental tanker are completed Constock will engage, directly or through affiliated companies, in selling large volumes of natural gas in liquid form in many industrial areas of the world where there is a growing shortage of reasonably priced energy fuels," Battson said.

"Through its operations Constock will meet the ever-increasing need of bridging the geographic gap between areas where large volumes of natural gas are available and where it is now a waste product, and the existing and potential markets for such gas.

Battson said all liquefied-methane operations will be conducted either direct by Constock or through affiliated companies.

Battson pointed out that when it is liquefied, methane gas contracts in the ratio of 600 to 1. Consequently, a barrel of liquid methane is equivalent in heating volume to about 3.5 M.c.f. of natural gas. This makes it feasible to transport in ships especially designed for the purpose large volumes of gas over long distances at an economic cost.

# Union Eyes Layoffs

## as major issue in negotiations for a new contract this year.

THE OIL, Chemical, and Atomic Workers union may make layoffs a top issue in 1958 contract negotiations.

Union President O. A. Knight said last week that "one thing is certain: We are going to have to move against these spreading layoffs."

The Union's bargaining policy committee will meet in Denver February 22-23, and Knight, at that time, will "make firm and specific recommendations for a program against layoffs."

"At a minimum," he said, "we are going to have to demand that the employers give us a substantial notice of their plans to lay off people, and that they give us an opportunity to sit down with them in such cases and negotiate alternatives to the layoff of people."

Knight said the union also will drive for wage increases.

"The propaganda is being peddled, by industry, that this is no year for wage increases," he said. "I disagree. Maybe it is not the year to blaze broad new trails on the wage issue, but wage earners are entitled to wage increases in keping with the increase in cost of living and the increase in worker productivity."

Knight said he wants to make it clear he is not recommending either for or against "an immediate, all-out drive for a shorter work week." He added that "sooner or later we are going to have to have a shorter work week."

Another possible union goal, mentioned by Knight, is the creation of a special fund of so-called "royalty payments" based on plant production as a supplement to hourly wages.

**Strike benefits . . .** Meanwhile, OCAW members heard a suggestion that it strengthen its strike defense fund by increasing payments to it from 15 cents to 50 cents per month per member.

Under the present system members receive $10 per week after the first 21 days of a work stoppage. Strike benefits totaling $333,675 were paid last year to 6,158 members. This was $14,539 more than was paid into the fund during the year.

The fund, on January 1, had $346,008 in it, OCAW Sec.-Treas. T. M. McCormick reported.

"If we become involved in any large, widespread strike, such as an industry-wide strike, let alone a union-wide strike, that defense fund balance would be insignificant," McCormick said.

By raising the fee to 50 cents per month, the defense fund would build up to $1 million and make possible weekly benefits of $25, instead of $10, he said.

# Texas Tidelands

## entitled to special hearing, U.S. Supreme Court told.

THE SUPREME COURT has been asked to take Texas out of the omnibus gulf-states boundary suit and hear its case separately.

Texas is entitled to such a hearing because its case involves factors different from those relating to the boundaries of the other four gulf states, Texas Atty. Gen. Will Wilson told the court.

Main basis of Wilson's argument is that Texas was an independent republic "with a right to determine its national boundary prior to its admission into the union."

"Because of this fact, the determination of her seaward boundary at the time of admission to the union involves consideration of documents, laws, treaties, diplomatic correspondence, and international law fully separate and distinct from issues, factual or legal, with which the other defendant states are concerned," Wilson said in his motion.

Texas is opposing the Justice Department's request that the court announce merely whether the boundary of the gulf states is 3 miles or 3 leagues without going into issues of fact.

The question of the exact boundaries of the states would be taken up after and if the court upholds the Government's contention that state lines coincide with the national 3-mile limit.

# Headlee Allowable Kept Low

## . . . despite protests from two firms. Commission extends 6-day schedule until gas program can be stepped up.

WEST TEXAS' big Headlee field will stay on a meager 6-day producing schedule much against the wishes of a vociferous minority group of producers in the field.

The Texas Railroad Commission has extended the field's 6-day schedule for the third time, this time indefinitely, as urged by the Headlee Devonian unit which represents the great majority of working interests in the field.

The commission, following hearings last month, held that the low allowable should continue until the unit is able to inject enough gas to stop steadily dropping bottom-hole pressure in the Devonian.

Headlee has been operating on 6 days since November 1, 1956, a rate ranging from one-third to one-half the state-wide allowable.

It was cut to that rate on an unusual application of most of the operators in the field. Their reason: a threatened loss of 50,000,000 bbl. of oil if Devonian pressure should fall below the saturation level before full-scale pressure maintenance could be achieved.

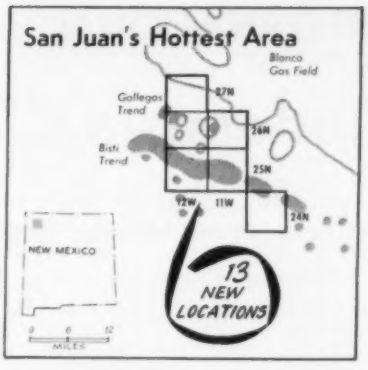
Last October the commission approved an 8,400-acre unit for the field and endorsed operators' plans for a high-pressure gas drive (OGJ, Oct. 14, 1957, p. 116). Limited gas injection through three input wells began December 1.

Producers protesting continuance of the low allowable at the January hearing were Carlton Beal & Associates and U. S. Smelting, Refining & Mining Co. (OGJ, Jan. 27, p. 138). These firms are the only working or royalty interest holders in the field not members of the unit. Both originally opposed removing the field from its state-wide status and fought the gas-injection plan.

Last month, Texas Gulf Producing Co., unit operator, said that hiking the field's production now would be disastrous, that pressure still was falling, and that some wells already are producing below the saturation pressure. With higher production, the company said, more wells would join this class and more avoidable waste would take place.

The company said the gas-injection program will be expanded as fast as feasible until all reservoir fluid voided would be replaced. Then would be the time to raise the field allowable, Texas Gulf said.

The unit, effective February 1, was expanded to cover 10,649 acres by extending the original boundary to take in another 2,258 acres. Plans call for eventual expansion to take in the entire 12,840 acres in the field.




# Bisti Trend Busy

## with development drilling. Gallegos also shares play.

THIRTEEN new locations have been announced in a spirited drilling development campaign currently under way in the Bisti and Gallegos trends of northwestern New Mexico's San Juan basin.

Shell Oil Co. made location for eight wells in the center of the Bisti trend and Humble Oil & Refining Co. spudded a well at the southern end of the trend.

The Bisti trend now stretches for a solid 24 miles, northwest to southeast. And beyond the southeast tip of the field there is production for another 8 to 10 miles.

In the Gallegos area, located between Bisti and the huge San Juan basin (Blanco) gas field, El Paso Natural Gas Co. has spudded four wells.

The Gallegos is a new Gallup area that began developing last year. It consists of two sections that parallel Bisti and are 8 miles in total length. The sections are separated by a 2-mile gap yet to be filled in.

# Giant Microwave Plans Bared

A 175-MILE microwave system connecting seven offshore platforms with Louisiana coastal installations will be built by the CATC group.

The longest microwave system in the Gulf of Mexico, the network will be designed for eventual use in automatic control of production facilities on offshore platforms.

Initially the system will be used for voice communications. It will be combined with short-wave radios now in CATC service, permitting telephone conversations between shore and boats, helicopters, drilling platforms, and tenders.

Construction is scheduled to start immediately. Completion is due late this year.

Motorola Communications & Electronics, Inc., has the contract to build the electronic equipment for the system. Contract for onshore microwave buildings and towers has been let to John D. Trilsch, Inc., Houston.

Onshore stations will be at Harvey, Lafitte, Grand Isle, and Venice, La., according to Continental Oil Co., operator for the CATC group. Offshore stations will be on seven CATC platforms in the Grand Isle area.

Design of the system will permit its eventual use in "opening and closing valves, starting and stopping motors, and remote reading of tank gages, well pressures, and flow volumes from producing platforms."

The only other major microwave system linking offshore platforms is operated by Magnolia Petroleum Co. for the MCN combine. This group includes Magnolia, Continental, and Newmont Oil Co.

The MCN system extends nearly 80 miles and links several offshore fields south of Morgan City.

## North Texas Plant Completed

A NEW natural-gasoline plant, incorporating the ultimate in automation, went on stream last week at Bridgeport, Tex. The new plant is designed to handle up to 150,000 M.c.f. of gas daily.

Warren Petroleum Corp., which owns 20 per cent of the plant, will be the operator. The other 80 per cent is owned by Christie, Mitchell & Mitchell Co., Houston, and their associates.

The plant will process 90,000 M.c.f. of gas daily at first. Initial extraction will include 115,000 gal. of LPG and 40,000 gal. of natural gasoline. Eventual recovery will be 160,000 gal. of LPG and 65,000 gal. of natural gasoline.

# Indonesia Closes Door

## . . . to Shell in northern Sumatra. Djakarta government nationalizes holdings in what looks like final ruling.

FIFTEEN YEARS after it was driven out of North Sumatra by the Japanese, and after 10 years of trying to get back in, Royal Dutch-Shell got the final news last week. It won't be going back.

When the Japanese left Indonesia at the point of Allied bayonets at the end of the war in the Pacific, Shell and two American companies moved back into Indonesia. They got back the producing and refining properties they held under concession before the war.

The lone exception was Shell in North Sumatra. There the Japanese had turned the fields over to the local government. The local people didn't want to give them up.

Since 1949, Shell has tried persistently to regain its refinery and producing properties on the northern tip of Sumatra. At times the central government at Djakarta seemed about ready to try and exert its tenuous authority over the independently minded local government in North Sumatra. At other times Djakarta was downright noncommittal.

Last week the central government took some action. It was belated, but it appeared to be final. It announced that the concessions held by Bataafsche Petroleum Mij. have been withdrawn. The properties have been declared state property.

This official action came weeks after Djakarta had already announced that it had set up a general oil holding company, directed by a board of army officers, and an operating affiliate to work the North Sumatra fields.

Early last month Ralph Edgington, president of Edgington Oil Refineries, Inc., Long Beach, Calif., made a contract with Indonesia to take the production of the northern fields. His dollar payment for the oil would be used by Indonesia to modernize and renovate the fields (OGJ, Jan. 6, p. 84).

Disclosure of Edgington's contract brought a reminder from Shell that it still claimed title to the oil fields and the crude they produce (OGJ, Jan. 27, p. 140).

**What's involved . . .** The concessions "withdrawn" by Djakarta last week consist of about 600,000 hectares (about 1,482,000 acres) on the northern tip of the island. They are known as the Atjeh and Tamiang blocks.

Before the outbreak of World War II, BPM produced about 22,000 bbl. daily of high-gravity crude from 10 fields on these concessions. In addition it operated an 18,000-bbl. daily topping plant at Pangkalan Brandan.

In the postwar era the badly rundown fields have produced only a few hundred barrels daily. The crude was processed in the now obsolete refinery for local use.

The withdrawal of the concessions will have no effect on Shell's current operations in Central Sumatra. There the company produces about 100,000 bbl. daily from other concessions that were returned after the war.

Last week's action was certainly no surprise to Shell, but there was a finality about it that has been missing before. The big international oil company isn't accepting this as the last word even if it is now highly unlikely the company's men will ever operate in North Sumatra again.

With typical restraint and understatement, a Royal Dutch-Shell spokesman in London reminded last week that discussions between his company and the Indonesian Government have been held "over an extended period."

"So far these discussions have been unsuccessful," the spokesman conceded, "but they are continuing."

He added that his company is hopeful a just solution will be found to the satisfaction of both parties.

# Atom Tanker Plan

## offered to Japanese. Ship may rival Universe Leader.

THE JAPANESE COMPANY that designed the once-feared 73,000-ton Musashi battleship has prepared plans for an atomic tanker.

Mitsubishi Heavy Industries was one of four firms submitting plans for an atomic tanker under government prompting. The Mitsubishi plan reportedly caused the most discussion.

The proposed vessel would be in the 80,000-ton class. It would be 856 ft. long, 125 ft. wide, and have a draft of 45.6 ft. Engines developing 40,000 hp. would drive the ship at 19 knots.

By comparison, the largest tanker in service, the 85,515-ton Universe Leader, is 855 ft. long, 125 ft. wide, and has a draft of 46 ft. Its residual-burning turbines deliver 21,175 hp. and drive the ship at a normal operating speed of 15 knots.

The Universe Leader carries a cargo of more than 600,000 bbl. of crude. An atomic ship in the same class would not need fuel tanks and would probably carry more.

The Mitsubishi design calls for a pressurized-water type reactor at the rear of the ship. It would be encased in a 24-in. thick concrete shell as a protection from radiation. Crews' quarters would be located amidship, more than 300 ft. away.

# Papua Wildcat Hits

## gas pay at jungle operation after earlier attempts fail.

OIL COMPANIES working in Papua have scored another point in one of the world's most knock-down, drag-out exploration programs.

Australasian Petroleum Co., Pty., and Island Exploration Co., have found medium gas flows in a wildcat drilled in the same general area where a jungle test blew out 2 years ago.

The gas came from Barikewa 3, an 8,025-ft. hole. The first two tests on the structure were dry holes. Barikewa is about 20 miles north of Omati. Kuru 1, which lost an estimated 50,000 M.c.f. daily for 6 months, is 40 miles northeast of Omati.

The Kuru well blew out from 998 ft. in January 1956. The No. 2 well was spudded as a replacement after the original hole was killed by cement from a slant hole.

Only one other well in recent years has shown this much promise in the $50-million exploration program that began in 1936. Omati 1 encountered high pressure gas at 13,743 ft. 3 years ago.

Barikewa 3 was among the last rigged up in Australian New Guinea by the conventional "on-the-ground" method. More recent tests have been set up with equipment brought in by helicopter.

Australasian Petroleum and Island Exploration are owned by British Petroleum Co., Ltd., Standard-Vacuum Oil Co., and Australian interests.

# Argentine Deal Snagged

**. . . by government failure to post bond. Laughlin-Porter, however, thinks 40-well drilling program can be revived.**

ARGENTINE plans to launch a 40-well development program on Tierra del Fuego, the half-Argentine, half-Chilean island at the southern tip of South America, have bogged down.

The wells were to have been drilled by Laughlin - Porter Drilling Co. of South America under a $3,000,000 contract with the Argentine Government.

The contract was hailed as the first Argentina has negotiated with a North American oil firm in many years.

The drilling program stalled due to failure of the government to post bond as required by terms of the contract.

Phillip E. Laughlin, Jr., president of the parent Laughlin-Porter Drilling Co., Midland, Tex., told the Journal last week that the contract had expired under its own terms due to the delay over the bond question.

He said the bond would have guaranteed payment to Laughlin - Porter for its services and likewise would have served as a guard against confiscation of the company's rigs.

Laughlin said that, though the old contract has expired, he is confident a new one can be worked out. There is little to go on, however, in predicting when it might happen, he said.

**Oil needed . . .** All 40 wells called for under the expired agreement were intended to develop discoveries made by Yacimientos Petroliferos Fiscales, the Argentine Government oil agency, at Rio Aviles and Arroyo Gama del Fuego.

These are the only two oil fields on the Argentine half of the island. Arroyo Gama field, with two producers, is about equidistant from the Chilean border on the west and the Atlantic on the east and roughly 8 miles south of San Sebastian Bay. Rio Aviles, with just one well, is about 6 miles farther south. The island has one shut-in gas well near Rio Grande.

Production from the two Argentine oil fields, termed "very fine Cretaceous production" from about 7,000 to 8,000 ft., currently is shut in. Across the border, however, an active Chilean drilling campaign has boosted oil output there to about 12,600 bbl. daily in just 9 years.

**Rig shipment postponed . . .** Laughlin-Porter planned to ship drilling equipment to Buenos Aires late last year in an effort to begin drilling early this year.

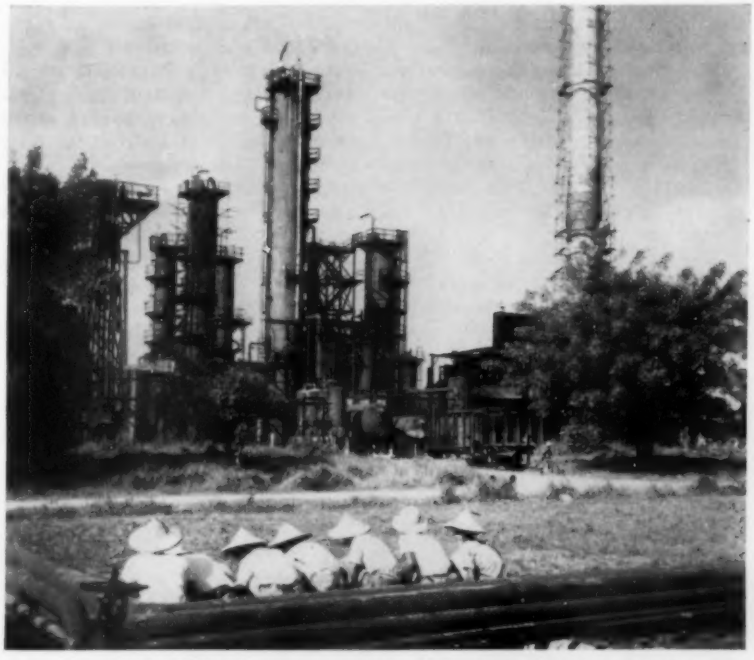
The shipment, now postponed indefinitely, would have included two 8,000-ft. rotaries and a small power completion unit. From Buenos Aires, it would have been transshipped to an Argentine Navy LST and landed on La Mission beach just north of Rio Grande, thence moving overland to the oil fields.

Any new contract negotiated by the government and Laughlin-Porter likely will closely parallel the old one.

The original deal was negotiated as a straight footage contract. Laughlin-Porter was to furnish the rigs, supplies, drilling mud and chemicals, cement and cementing operations, labor, and supervision. Argentina was to supply the pipe and logging and perforating services.

The development program was expected to take about 2 years to complete.

The contract contained a reimbursement or liquidated - cost clause for contractor protection in case fewer than 40 wells were drilled. Another clause specified that, in case boundaries of the two oil fields should be defined before the full 40 wells were drilled, any remaining holes would go for exploration.



**THIS REFINERY** will get an alkylation unit, making it possible for . . .

# Formosa to Produce Avgas

CHINESE PETROLEUM CO.'s refinery on Formosa will place on stream this year a 900-bbl. daily alkylation unit to produce aviation gasoline.

Caltex will take the entire avgas supply. The unit will produce three grades of octane—100-130, 108-135, and 115-145.

The refinery itself has a 28,000-bbl. capacity and is currently averaging an 18,000-bbl. throughput. This takes care of domestic consumption on Formosa and allows for exports of residual and asphalt to southeast Asia.

The Nationalist Chinese hope to develop substantial crude production on the island, although output currently is less than 100 bbl. daily.

Nationalists say they have found oil or gas shows in 75 per cent of 300 wells drilled in the past 2 years. Drilling is shifting from the central foothills to the western plains.

# Rebels Boast of Refinery Fire

**. . . in Cuba. Esso disaster described by Castro follower as first move in violent campaign to sabotage industry.**

AN AMERICAN REFINERY near Havana may have been the first victim in a new campaign of sabotage planned by rebels battling to overthrow Fulgencio Batista, Cuba's military president.

Cuban rebels say they caused the spectacular fire which consumed 12,000 bbl. of gasoline at the Belot refinery operated by Esso Standard Oil Co., S.A. Esso says it still doesn't know what caused the fire.

The blaze was regarded as just another industrial accident until a young Cuban rebel boastfully told an American newsman in Cuba last week that his group was responsible. The youthful rebel leader in the forces of Fidel Castro predicted that "all Cuba" will be in flames within a month.

He said the Castro forces are going to center their attention on disrupting industry in an effort to prevent Cuba's national election June 1. The rebels call the upcoming election a farce and say it will be controlled by Batista even if he cannot be re-elected president.

The rebel spokesman, using the admittedly assumed name of Luis Perez Rios, said the Esso refinery fire was the first move under the new Castro plan of action. He hastened to add that the rebels are not concentrating on American industrial firms in Cuba. He said Esso's refinery just "happened to be handy."

**Investigation under way . . .** The fire which broke out January 27 was confined to one storage tank at the 35,000-bbl. refinery across the bay from Havana. Five men were hospitalized with injuries received fighting the fire.

Spokesmen for the oil company said last week the fire broke out after a connecting line broke and flooded the area between the tank and the fire wall. What ignited the gasoline is not known.

The Cuban rebel leader said the method of starting the fire is a "military secret." His statements caused some speculation in this country that the rebels may have merely seized upon an industrial accident for their own propaganda purposes.

Esso, like other American companies in Cuba, is making every effort to avoid becoming implicated in the island's swelling political turmoil. If the company's investigation does pin the fire on sabotage, the findings probably will never be made public.

# French Hit Again in Sahara

THE FRENCH - SHELL company which made the Sahara Desert's first oil discovery and started North Africa's "oil boom" has a third field discovery.

Reports from Paris indicate the latest find is a deeper, and probably a thicker, pay than the sand found at Edjele. It is about 40 miles northwest of Edjele and gives the company three fields located in a triangle just about 40 miles apart.

The French said last week that the discovery well at Zarzaitine produced about 65 bbl. an hour from an interval found at 4,000 ft. Officials of Cie. de Recherches et d'Exploitation de Petrole au Sahara (CREPS) cautiously called the strike "encouraging." The Royal Dutch-Shell Group owns 35 per cent of CREPS.

First reports of the new discovery gave only meager details, but the oil strike apparently was made by deepening the No. 2 Zarzaitine well. The company has three wells grouped less than 2 miles apart in the area, and all produced gas distillate on earlier tests.

The initial CREPS discovery was at Edjele, about 40 miles southeast of Zarzaitine and only a stone's throw from the Algerian-Libyan border. The company now has 20 shut-in wells in the field, all ready to produce from a 1,500-ft. Carboniferous sandstone which yields a 35°-gravity crude.

The field can't be produced until a pipeline outlet is furnished for it, and no decision has yet been made on a route for the line to the Mediterranean.

French government sources have estimated Edjele's reserves "conservatively" at 375 million barrels.

Almost directly west of Edjele about 40 miles, CREPS has six wells at Tiguentourine. This pay is similar to Edjele's but is at 2,500 ft.

## ——— *World* briefs

**Mene Grande Oil Co. will start exporting** LPG from Venezuela within a few months. The company is building two 60,000-bbl. tanks at Puerto La Cruz to store LPG coming from the 59,000-bbl. refinery of Venezuelan Gulf Refining Co. The tanks are expected to be ready by June. First shipments are scheduled to go to Brazil. Sales to Europe are expected in the near future.

**Creole Petroleum Corp. has completed** a $3-million desulfurization plant at its Amuay refinery. The new Hydroformer, the only one of its kind in Venezuela, will treat up to 17,500 bbl. daily of diesel oils. The unit, built by Foster Wheeler Corp., is part of one of the largest construction programs in Amuay history. The refinery's fourth distillation unit, with capacity of 104,000 bbl. daily, has already been put on stream. A 700-bbl. lubricating oil plant, opening this year, will round out the program.

**The President of Bolivia has signed** a decree making official the 284,165-acre concession of Cataract Mining Corp. The tract is located in Zone 1, in Chiquitos province.

**Universe Leader, the world's biggest** tanker, recently carried a record load of 603,361 bbl. of Saudi Arabian crude plus another 34,777 bbl. of bunker fuel. The 85,515-ton vessel was loaded at Ras Tanura in 15 hours and 50 minutes. The cargo was bound for Santos, Brazil.

**Israel has ordered a 50,000-ton** tanker from a French shipyard in its program to build a 250,000-ton fleet in 5 years. Four oil carriers are now in service.

**Petroleos Mexicanos will start supplying** Lower California with domestically refined gasoline and diesel oil when it completes a new tanker terminal at Ensenada this year.

The home-refined products will eliminate imports of gasoline and diesel oil from U.S. West Coast refineries. Total shipments into the area now are about 4,000 bbl. daily. This includes residual which will continue to be imported.

**The Middle East's first combination** UOP Platforming-Unifining unit is on stream at Bahrain Petroleum Co.'s 211,000-bbl. plant at Bahrain. The unit has a design capacity of 11,000 bbl. daily. The Unifining section serves as a pretreater for the Platformer. Universal Oil Products Co. handled engineering and design.

# J&L Service

## wraps up the world's most wanted

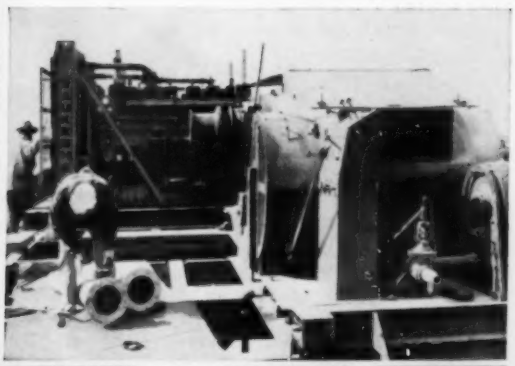
# Rotary Rigs

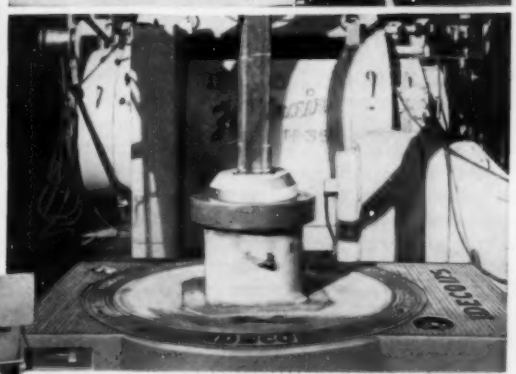
A driller's natural desire to own the last word in equipment has made Ideco the most wanted rotary rigs in the world.

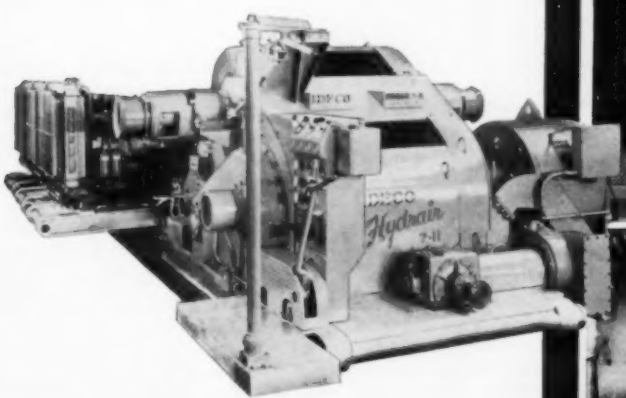
J&L parts service wraps up this situation — makes these finest of all rigs the best buy in the United States and Canada.

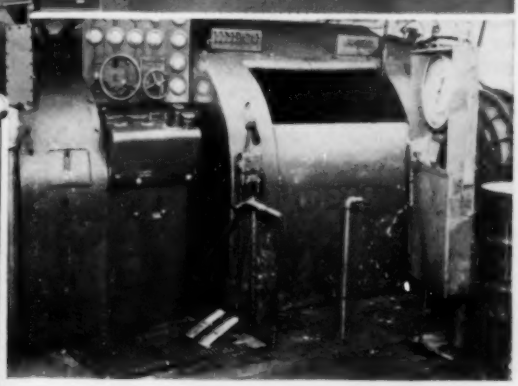
J&L has an Ideco designed and rated to do the job you have in mind and — thanks to J&L service — keep on doing it.

For detailed descriptions, specifications, performance characteristics, get your J&L store on the telephone. Ask for Catalog.







Rig capacities from 2,500′ to 20,000′ with 4½″ drill pipe. Rigs to 6,000′ capacity can be trailer mounted.

"Hydrair" hoists combine a hydraulic torque converter drive with air clutch and air controls.

Power rigs have a mechanical or fluid-coupling drive, with air clutch and air controls.

**Jones & Laughlin**

**SUPPLY DIVISION** – Tulsa

J&L – A GREAT NAME IN SUPPLIES

10

PRODUCTION

# Why those low lateral readings?

**Here's a tentative explanation of why some pay sands show abnormal readings. It's based on the fact that "most shales are anisotropic, and may often be more anisotropic than the sands—except those containing thin laminations."**

BY MAURICE MARTIN and K. S. KUNZ, Schlumberger Well Surveying Corp.

IT IS WELL KNOWN that the lateral curve in many cases shows some complex features which make the interpretation unreliable. For example, the lateral readings are extremely low underneath a thin resistive bed (the so-called blind zone or shade zone). If another thin bed of interest happens to be included within a shade zone, its apparent resistivity is always very low, even if its true resistivity actually is high.

It has also been observed in sand-shale series that the lateral curve shows abnormally low readings, down to a fraction of 1 ohm-m., opposite certain sands which prove to be good oil producers, **in the absence of any other nearby bed which might disturb the response.** This phenomenon, which frequently causes incorrect interpretation of the logs (with the result that some pay sands may be missed), is the subject of this article.

Fig. 1 shows one typical example of this particular feature of the lateral.

A is a 5-ft.-thick sand of the Yegua group, which is indicated clearly by the SP curve, the short normal and the MicroLog. The lateral reading is 0.6 ohm-m., whereas the result of the production test was 86 bbl. of oil per day and no water.

The analysis of the logs gives the following:

The value of $R_{xo}$, flushed zone resistivity, computed from the MicroLog, is equal to 6 ohm-m. The deflection of the SP curve, after correction for bed thickness, is about −45 mv. For the thick bed B between 7,092 and 7,144 ft. the SP deflection is −80 mv. These two figures can be taken for the value respectively of the pseudostatic SP and of the static SP. Supposing that, for clean-oil production, the water saturation were not higher than 40 per cent, it can be seen from Chart D-4 of the Schlumberger book of Log Interpretation Charts that $R_{xo}/R_t$ should be equal to 1.6 and $R_t$ accordingly to $6/1.6 = 3.7$.

In fact the usual correction charts would show that for this value of $R_t$ and a 5-ft. bed thickness, the reading of the lateral should be about 2.4, rather than 0.6.

The explanation which is tentatively advanced below to account for this behavior of the lateral log is based on the fact that most shales are anisotropic, and may often be more anisotropic than the sands—except those sands containing thin laminations.

In the following, a few essential data relevant to anisotropic media will be presented. The response of the lateral device will be discussed on the basis of a schematic analysis and laboratory tests. Practical conclusions will then be inferred from this discussion.

### Resistivity Measurement in Anisotropic Media[1]

It is known that in sedimentary formations the current flows more easily along the bedding plane than perpendicular to it. Supposing the stratification is horizontal, it is possible to ascribe to the formation two resistivity values, namely $R_H$ and $R_V$, which are the resistivities of the formation for uniform currents flowing respectively in a horizontal and a vertical direction. It is furthermore convenient to define an average resistivity $R_{av}$, as the geometric average of $R_H$ and $R_V$—and an anisotropic coefficient $\lambda$ equal to $(R_V/R_H)^{1/2}$. Accordingly, $R_{av}$ is equal to $\lambda R_H$.

**(a) Homogeneous medium . . .** It has been shown by mathematical analysis[2] that the potential difference measured with a logging device in homogeneous anisotropic medium perpendicularly to the bedding plane can be computed by means of the following transformations:

The anisotropic medium is replaced by an isotropic medium, resistivity $R_{av}$.

The distance between the electrodes are multiplied by $\lambda$.

Consider, for example, the case of a lateral AMN located within an anisotropic medium, such as:

$$R_H = 1,\ R_V = 4,\ R_{av} = 2,\ \lambda = 2$$

Neglecting the effect of the mud column, the equivalent configuration is:

$$\text{Formation resistivity} = R_{av} = 2$$

$$A'M' = 2\,AM \qquad A'N' = 2\,AN$$

from which it is then possible to determine the apparent resistivity $R_a$ read with the lateral.

The apparent resistivity is given by:

$$R_a = K\frac{\Delta V}{i}$$

where $\Delta V$ is the voltage measured between the pickup electrodes MN for a current i flowing through the power electrode A, and K is a calibration coefficient equal to:

$$\frac{4\pi}{1/AM - 1/AN}$$

The value of $\Delta V$, on the other hand, by virtue of the transformation, is given by:

$$\Delta V = i\frac{R_{av}}{4\pi}[(1/A'M') - (1/A'N')]$$

$$= i\frac{R_{av}}{4}[(1/2AM) - (1/2AN)]$$

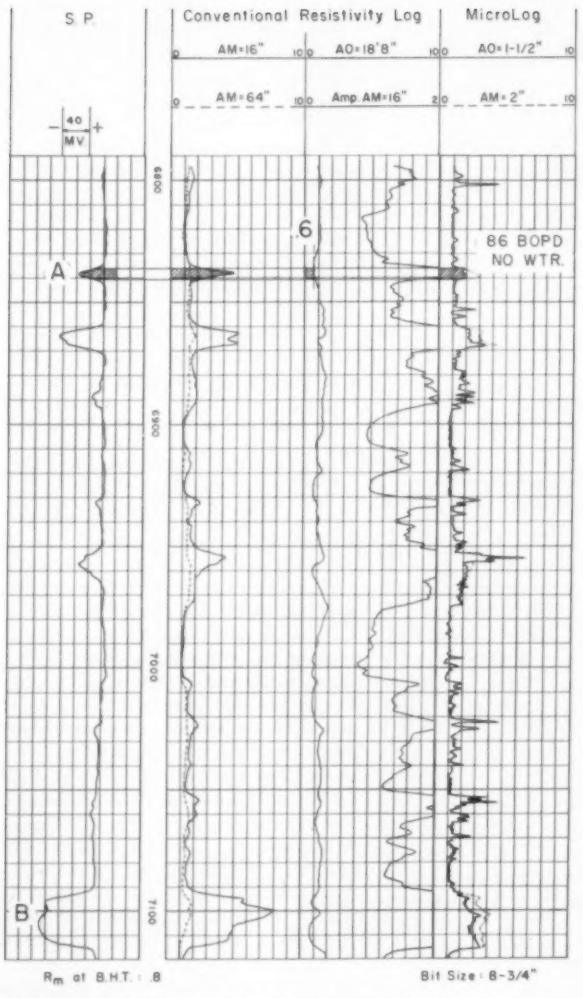
$$= i\frac{R_{av}}{2K}$$

Hence:

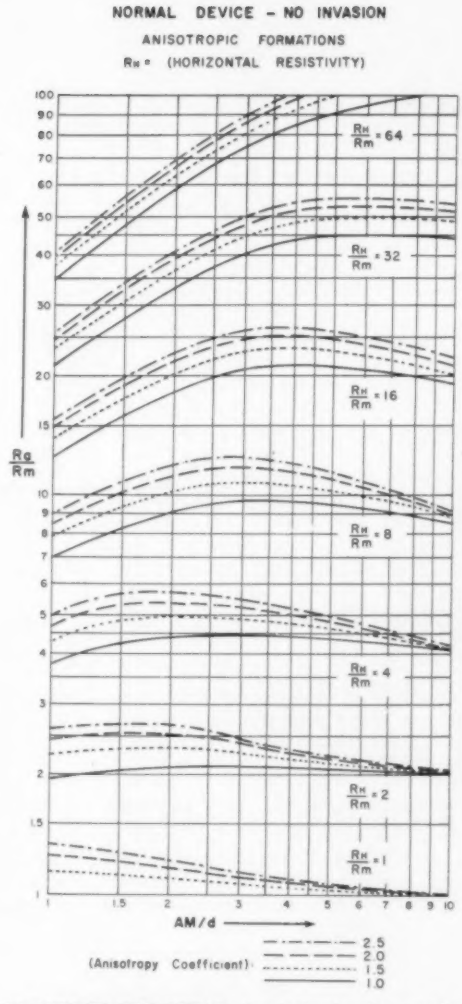
$$R_a = \frac{R_{av}}{2} = R_H$$

and thus the device measures the horizontal resistivity. It can be shown likewise that the normal device would also read the horizontal resistivity.

**(b) Thick homogeneous bed traversed by a bore hole . . .** Computations have shown that the effect of the bore




**ROUTINE ANALYSIS** of this log might overlook the oil potential of the pay zone at A. This 5-ft. sand tested for 86 bbl. of oil per day with no water. Fig. 1.




**IN ANISOTROPIC MEDIA,** the induction log reads lower than the short normal. If the difference is 30 per cent, the anisotropic coefficient is about equal to 2. Fig. 2.

hole is to bring the apparent resistivity to a higher value than the value which would be obtained with an isotropic medium of resistivity $R_H$, all other conditions being the same. The difference is appreciable when the spacing is comparatively short. It decreases with increasing spacing and becomes negligible for a very long spacing.

These results are illustrated by Fig. 2, which shows the departure curves for normal devices computed for homogeneous formations of various resistivities and various anisotropy coefficients. These departure curves are presented with the spacing as the abscissa and the ratio $R_a/R_m$ as the ordinate. (This is in the same way as in the Schlumberger Documents 3 and 7.) It can be seen for example that, when $R_H = R_m$, and $\lambda = 2$, the 16-in. short normal (AM/d = 2) and long normal (AM/d = 8) read, respectively, 1.3 $R_H$ and 1.05 $R_H$. Also, for $R_H/R_m = 4$, the readings of the short normal and long normal are 4.4 and 4.2 if the formation is isotropic ($\lambda = 1$) against 5.3 and 4.3 if $\lambda = 2$.

The results for the lateral device are not presented, because, for the standard spacing (AO = 18 ft. 8 in.) the lateral reads $R_H$, except in case of a very high $R_H/R_m$ ratio.

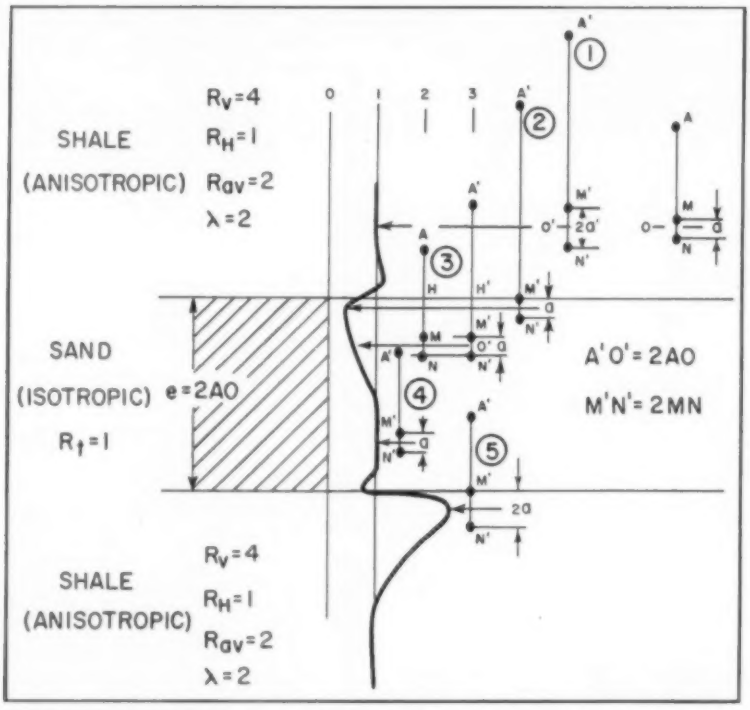
The effect of anisotropy is evidenced by a comparison of the short normal and induction log readings opposite shales. The induction log reads $R_H$, because the currents induced in the ground flow along horizontal loops—and also because the effect of the bore hole, in case of fresh mud, is practically negligible (except in case of deep caves). In anisotropic media, the induction log should therefore read lower than the short normal. This difference is indeed frequently observed at the level of shales. The difference sometimes attain 30 per cent, which, according to Fig. 2, may correspond to an anisotropy coefficient of about 2.

### Schematic Analysis of the Behavior of the Lateral

The case of a thick bed will be considered first.

Fig. 3 shows one isotropic bed, resistivity $R_t = 1$, thickness e = AO, noninvaded, sandwiched between two anisotropic formations, $R_H = 1$, $R_V = 4$, $\lambda = 2$. (In the following, to simplify the wording, the bed will be referred to as a "sand" and the adjacent formations as "shales.")

Supposing the lateral AMN is located within the upper shale, this shale can be replaced by an isotropic formation of resistivity $R_{av} = 2$, and




**HERE'S WHAT HAPPENS** when a thick isotropic bed is sandwiched in between two anisotropic beds. A maximum occurs just below the lower boundary of of the bed. Fig. 3.

the devise by the spacings $A'O' = 2\,AO$, $M'N' = 2\,MN$.

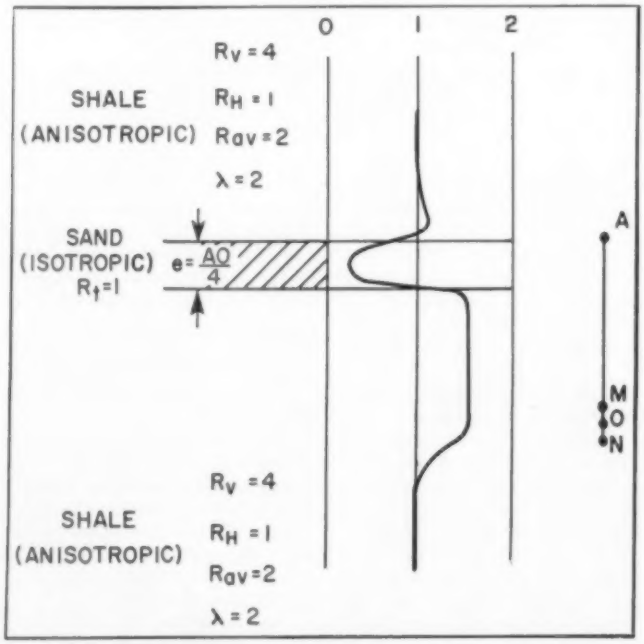
In Position 1, at a distance from the upper boundary, the reading is $R_H = 1$. This reading remains the same until MN comes very close to the boundary. When MN crosses the boundary (Position 2), M'N' becomes equal to MN since M and N are now within an isotropic bed. The distance A'O' has not appreciably changed. For an MN spacing unchanged above and below the boundary, the potential difference would change in a ratio equal to the ratio of the resistivity below versus the resistivity above, i.e., $R_t/R_{av}$, which, in the present instance, is equal to 1/2. But, since MN is reduced by a factor of 2 on crossing the boundary, the potential difference finally is divided approximately by 4. In other words, the apparent resistivity decreases abruptly in a ratio of about 4 to 1.

For a location of O' further down in the sand (Position 3) the actual spacing AO can be divided into two portions AH and HO respectively above and below the boundary. The equivalent distance for AH is $A'H' = 2\,AH$, but the distance HO is unchanged, so that the over-all equivalent spacing A'O' is no shorter than before. So, as the sonde is moved downward, the equivalent spacing A'O' progressively decreases, and the apparent resistivity increases.

After A in turn enters the sand, the reading soon becomes equal to $R_t = 1$ (Position 4) and remains steady until O' comes close to the lower boundary. When O' crosses the lower boundary (Position 5), the equivalent M'N' again becomes equal to 2 MN, because M'N' is again within an anisotropic formation. The apparent resistivity is multiplied by 4. Further down, the resistivity decreases until the value of $R_H = 1$ is reached.

Fig. 4 shows the pattern obtained through a similar reasoning applied to the case of a thin bed, $e = AO/4$, all other conditions being the same as in the preceding example. It is seen that the curve displays a minimum at the level of the bed, then a maximum below the lower boundary.

A similar discussion can apply if other values are taken for the resistivities of the formations. If the resistivity of the sand for example is equal to 10 instead of 1, the curve will show a peak at the level of the bed instead of a depression, but the reading will be less than that value which would obtain if the shales were isotropic, all other conditions being the same.

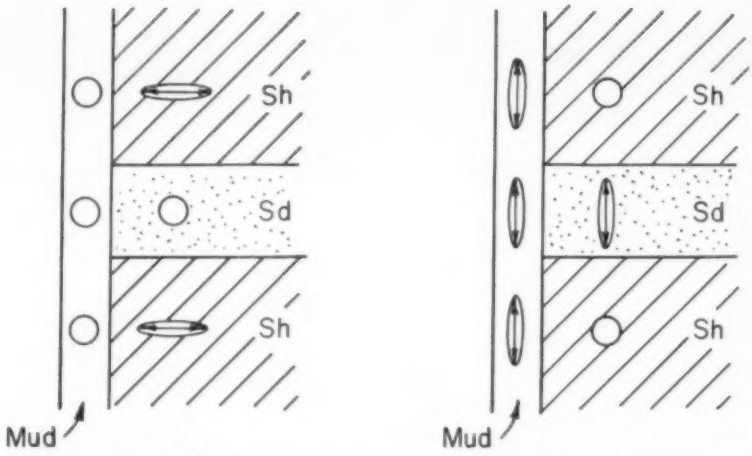



**NOTICE HERE** that the resistivity curve shows a minimum when passing through the thin sand and logs a maximum below the sand. Fig. 4.

### Laboratory Tests

These findings were checked by means of certain laboratory tests. The laboratory setup used for these tests is a network of calibrated resistors, arranged to simulate the geometry and the resistivities of the media involved, namely: mud column, invaded zone, uncontaminated zone, adjacent formations.

To facilitate the construction of the model corresponding to the present problem, the system was transformed




**LABORATORY EXPERIMENTS** were conducted simulating various conditions that might be encountered in the bore hole. Circles denote isotropy; horizontally elongate ellipses denote actual anisotropy; vertically elongate ellipses denote artificial isotropy. Fig. 5.

into an equivalent configuration: the sand was taken **anisotropic** with a vertical resistivity **lower** than the horizontal resistivity and the shales were taken **isotropic.** The two equivalent configurations are shown schematically in Figs. 5a and 5b, where the circles denote isotropy, the horizontally elongated ellipses indicate actual anisotropy, and the vertically elongated ellipses indicate artificial anisotropy ($R_V < R_H$).

Figs. 5a and 5b show that, with such a transformation, the mud should be made anisotropic. Since, however, the influence of the mud column on the lateral reading is generally negligible, when the resistivity contrasts between the formations and the mud are small, it was felt possible to leave the mud unchanged. An attempt to simulate the anisotropy of the mud would have involved rather extensive changes in the network.

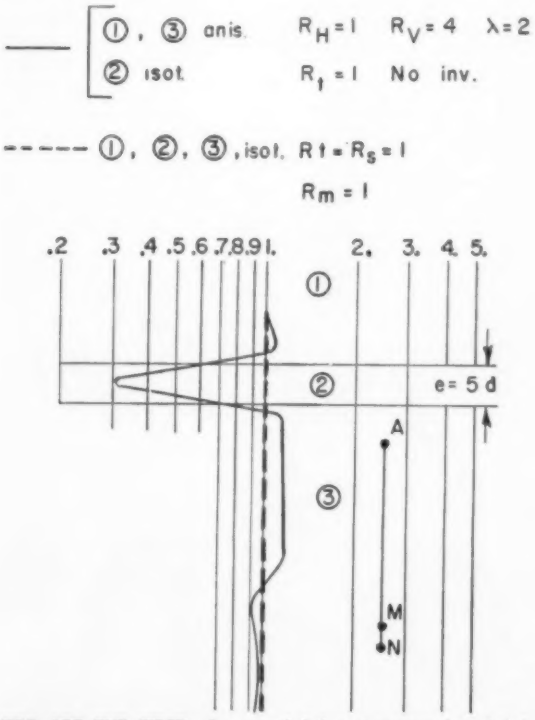
The bed thickness was taken equal to five hole diameters. The actual parameters for the adjacent formations before transformation, were $R_H = 1$, $R_V = 4$, $\lambda = 2$, as in the preceding discussion.

The essential results of this investigation are presented in Figs. 6, 7, 8, and 9. On these figures, the solid curves are the logs recorded on the resistor network with the numerical conditions listed above. The dotted curves, which are traced for comparison, correspond to the same conditions, but for isotropic shales, $R_t = 1$.

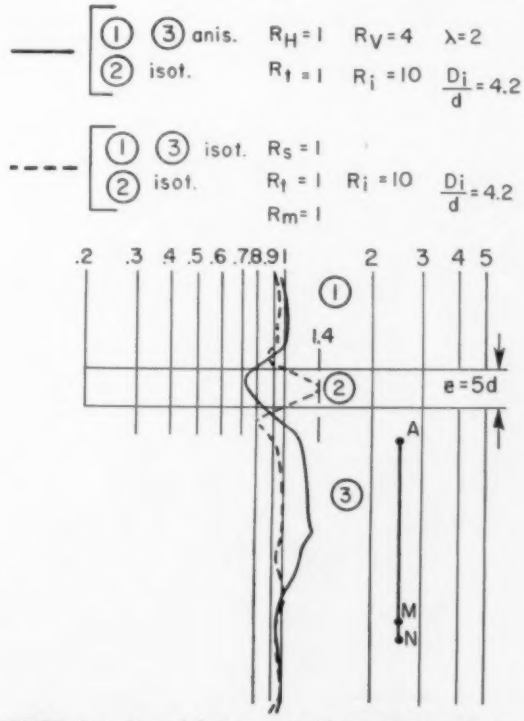
Fig. 6 shows the results obtained with a noninvaded bed, resistivity $R_t = 1$ and with the mud resistivity $R_m$ equal to 1.

The experimental curve confirms the schematic graph shown on Fig. 4. Whereas the curve would be a flat line if all the media were isotropic, as shown in dots, the log obtained with anisotropic adjacent shales displays a sharp depression at the level of the sand, with a reading of 0.3 instead of 1.

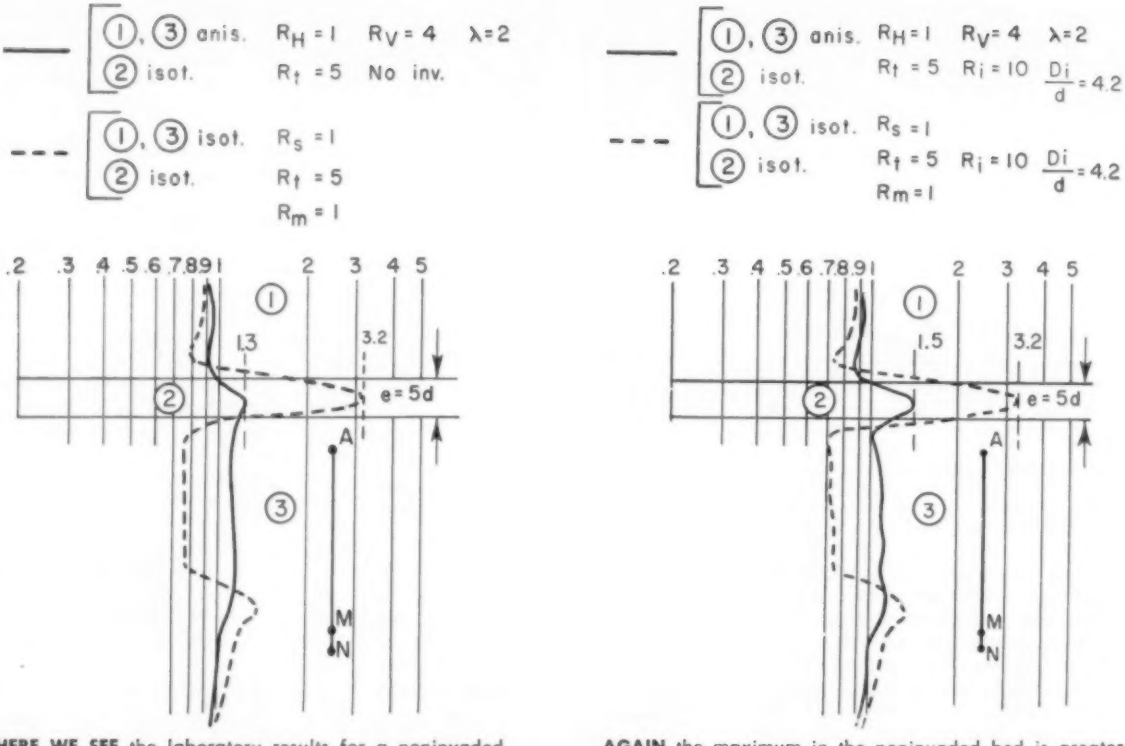
Fig. 7 is related to an invaded sand, with $R_t = 1$, $R_i = 10$, $D_i/d = 4.2$, $R_m = 1$. Here, the dotted line shows a small peak (maximum resistivity 1.4), due to the invaded zone being more resistive than the uncontaminated zone. The solid curve and the dotted




**HERE ARE THE FIRST** of several laboratory results. Solid curve is based on conditions as shown; dotted curve corresponds to the same conditions, but for isotropic shales. Fig. 6.




**NOTICE** that the solid line resembles very closely the curve shown in Fig. 4. The solid curve and the dotted are roughly symmetrical through the sand body. Fig. 7.


①, ③ anis. $R_H = 1$ $R_V = 4$ $\lambda = 2$
② isot. $R_t = 5$ No inv.
①, ③ isot. $R_s = 1$
② isot. $R_t = 5$
$R_m = 1$
①, ③ anis. $R_H = 1$ $R_V = 4$ $\lambda = 2$
② isot. $R_t = 5$ $R_i = 10$ $\frac{Di}{d} = 4.2$
①, ③ isot. $R_s = 1$
② isot. $R_t = 5$ $R_i = 10$ $\frac{Di}{d} = 4.2$
$R_m = 1$
.2 .3 .4 .5 .6 .7 .8 .9 1 2 3 4 5
1.3
3.2
e = 5d
A
M
N
1.5

**HERE WE SEE** the laboratory results for a noninvaded bed. When the shale is isotropic, the resistivity maximum is considerably greater. Fig. 8.

**AGAIN** the maximum in the noninvaded bed is greater when the shale is isotropic. Fig. 9.

curve are roughly symmetrically located with respect to ordinate 1; a small depression in the solid curve is again observed at the level of the bed (minimum resistivity 0.7).

The curves for a noninvaded bed, $R_t = 5$, $R_m = 1$, are represented on Fig. 8. The dotted curve reaches a maximum of 3.2. This maximum is brought down to 1.3 on the solid curve.

Fig. 9, traced for an invaded bed, $R_t = 5$, $R_i = 10$, $D_i/d = 4.2$ calls for similar comments. The maximum resistivities are respectively 3.2 and 1.5.

It has been seen that, for the laboratory tests, the anisotropy coefficient of shales was taken equal to 2. In fact, a few measurements made on samples of pure shale have not given as large a value—never more than 1.5. But, on the other hand, the comparison of the short normal curve and of the induction log, as mentioned above that $\lambda$ may reach 2 and even more.

### Application to Field Logs

It seems, at any rate, that the assumption of anisotropic shales and isotropic sand may account to some extent for the anamolous behavior of the lateral curve, as observed on the logs.

A procedure to correct the lateral reading for this effect under some particular conditions was proposed by J. J. Maricelli.[3] A more general solution was therefore sought.

For this investigation, the following assumptions were made:

- The bore hole and the invaded zone have a negligible effect (this is permissible with the lateral in low resistivity formations, such as unconsolidated sand-shale series).
- The shales above and below the bed are identical and their horizontal resistivity $R_H$ can be read off the lateral curve.

With these assumptions, the problem involves two unknowns:

True bed resistivity: $R_t$.

Anisotropy coefficient of shales: $\lambda$.

Theoretically, $R_t$ and $\lambda$ could be derived from two particular readings of the curve, such as the minimum (or maximum) at the level of the bed and the maximum (or minimum) underneath the bed.

It seems more advisable in the determination of $R_t$ to rely on other measuring devices which are not sensitive to the effect of shale anisotropy. It can be shown that the normal readings would not change much opposite a given sand, whether the shales are isotropic or not. However, using the short normal may be misleading because of the effect of invasion. The short normal reading can be taken as being the best approximation of $R_t$ only when the bed is known through the lateral log to be comparatively resistive—but, in the present situation, the lateral fails to show the resistive beds.

The long normal, on the other hand, is of no great use when the bed is less than about 10 ft. thick.

The proper tool to solve the problem should have a sufficient radius of investigation to overcome the effect of invasion, and furthermore, be little affected by the adjacent formations. These conditions are sufficiently well fulfilled by the induction log.

The authors acknowledge the valuable contribution of J. Moran in the computations. They wish to express their appreciation to J. Baker and S. L. Showah, who carried out the laboratory experiments, and to P. P. Favier, W. R. Mills, G. J. Decker, and R. P. Alger who provided field data.

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2. R. Maillet and H. G. Doll, Sur un theoreme relatif sux milieux electriquement anisotropes et ses applications a la prospection Electrique en courant continu (Ergonzungshefte fur angewandte geophysik, 1932, 3, 1).

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## Price tags on

# Seven methods of removing $CO_2$

## from high-$CO_2$-content gas

BY J. F. MULLOWNEY

A COMPARISON is given here of the battery limits investment and operating costs for treating a gas stream containing about 34 per cent carbon dioxide down to 10-25 p.p.m. (by volume) by different treating schemes. Such a gas stream would be found in a plant manufacturing ammonia from natural gas by the use of a partial oxidation burner, or it might be encountered as a natural gas.

Author is with the Fluor Corp., Ltd., Los Angeles. Paper was presented at California Natural Gasoline Association meeting.

The results of the study are believed to be valid for high-$CO_2$-bearing gases over a considerable range on either side of the 34 per cent $CO_2$ content arbitrarily picked for the study.

To obtain a comprehensive picture of the investment requirements and operating costs for various process schemes, seven different treating schemes were studied:

**How the seven methods compare dollarwise** Fig. 1

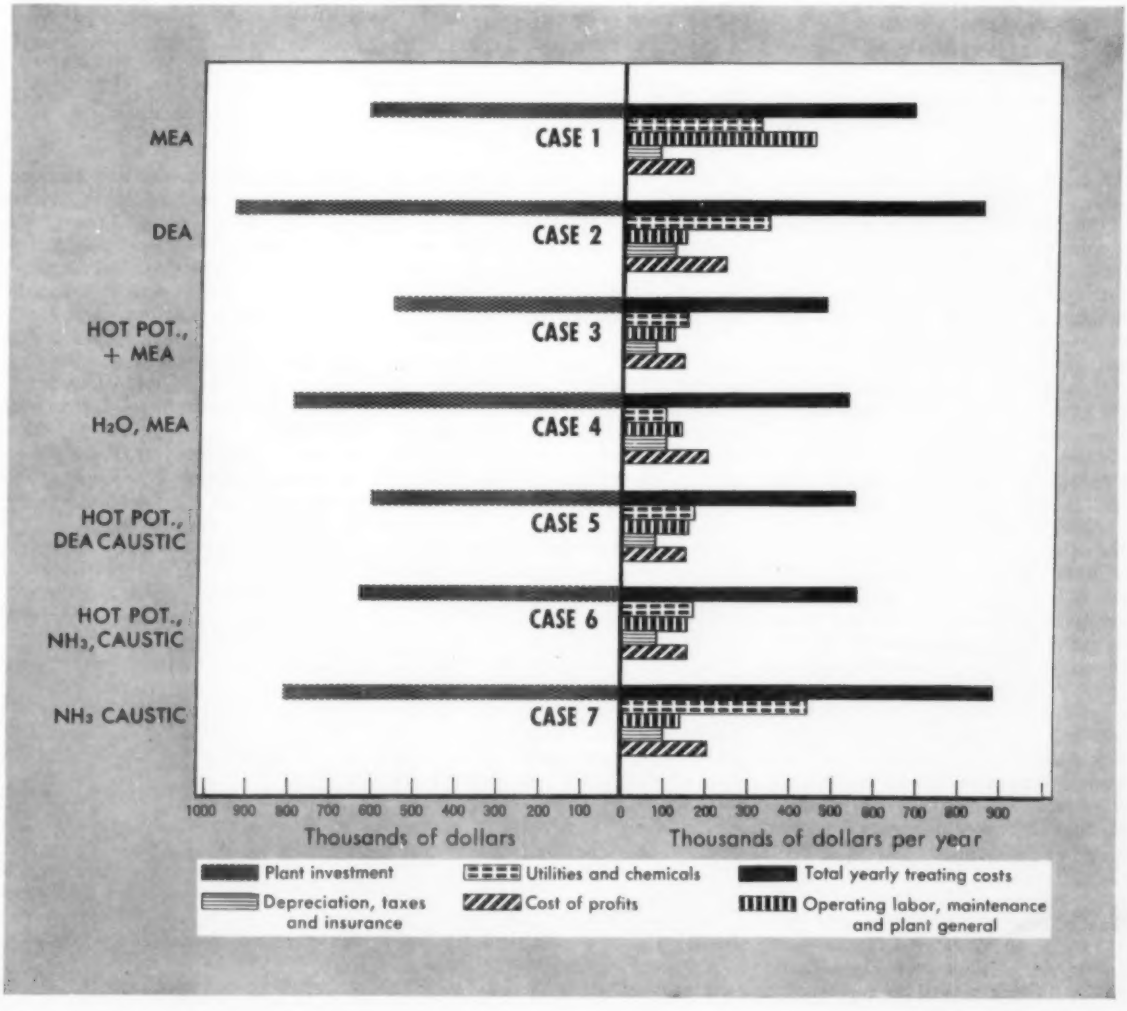


Table 1—Plant investment and operating costs, removal of 34 per cent $CO_2$ content

| CASE | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| **Plant Investment** | **$607,000** | **$921,000** | **$545,000** | **$596,000** | **$619,000** | **$778,000** | **$793,000** |
| Direct Operating costs $/year | | | | | | | |
| Utilities $/year | | | | | | | |
| Steam @ $0.55/1,000 lb. | 262,000 | 252,000 | 93,000 | 97,000 | 96,000 | 10,000 | 366,000 |
| Electricity @ $0.01 KW.-HR. | 19,000 | 29,000 | 19,000 | 18,000 | 21,000 | 41,000 | 19,000 |
| Cooling water @ $0.02/1,000 gal. | 32,000 | 32,000 | 18,000 | 18,000 | 19,000 | 7,000 | 33,000 |
| Process water @ $0.10/1,000 gal. | | | | | 1,000 | | 11,000 |
| Gas losses @ $0.50/1,000 std. cu. ft. | 4,000 | 3,000 | 7,000 | 8,000 | 5,000 | 37,000 | 3,000 |
| Chemical losses @ cost | 2,000 | 17,000 | 11,000 | 26,000 | 26,000 | 2,000 | 3,000 |
| **Subtotal** | **319,000** | **333,000** | **148,000** | **167,000** | **168,000** | **97,000** | **435,000** |
| Operating labor | 47,000 | 47,000 | 47,000 | 66,000 | 66,000 | 47,000 | 47,000 |
| Maintenance @ 4% plant cost | 24,000 | 37,000 | 22,000 | 24,000 | 25,000 | 31,000 | 32,000 |
| plant general | 51,000 | 58,000 | 50,000 | 66,000 | 67,000 | 55,000 | 55,000 |
| **Subtotal** | **122,000** | **142,000** | **119,000** | **156,000** | **158,000** | **133,000** | **134,000** |
| **Total direct costs** | **441,000** | **475,000** | **267,000** | **323,000** | **326,000** | **230,000** | **569,000** |
| Indirect operating costs $/year | | | | | | | |
| Depreciation @ 10% of plant cost | 61,000 | 92,000 | 55,000 | 60,000 | 62,000 | 78,000 | 79,000 |
| Taxes and insurance | 15,000 | 23,000 | 14,000 | 15,000 | 15,000 | 19,000 | 20,000 |
| **Total indirect costs** | **76,000** | **115,000** | **69,000** | **75,000** | **77,000** | **97,000** | **99,000** |
| **Total of operating costs** | **517,000** | **590,000** | **336,000** | **398,000** | **403,000** | **327,000** | **668,000** |
| Cost of profit (before income tax) @ 25% of plant cost $/year | 152,000 | 230,000 | 136,000 | 149,000 | 155,000 | 195,000 | 198,000 |
| **Grand total treating cost $/year** | **$669,000** | **$820,000** | **$472,000** | **$547,000** | **$558,000** | **$522,000** | **$866,000** |
| Treating cost— Dollars per M.C.F. gas treated | $ 0.16 | $ 0.19 | $ 0.11 | $ 0.13 | $ 0.13 | $ 0.12 | $ 0.20 |

Case 1. Aqueous monoethanolamine.

Case 2. Aqueous diethanolamine followed by caustic treating.

Case 3. Hot potassium carbonate followed by aqueous monoethanolamine.

Case 4. Water scrubbing followed by aqueous monoethanolamine.

Case 5. Hot potassium carbonate followed by aqueous diethanolamine then caustic scrubbing.

Case 6. Hot potassium carbonate followed by aqueous ammonia treating and caustic scrubbing.

Case 7. Aqueous ammonia followed by caustic scrubbing.

● **Of the schemes studied,** and with the cost assumptions made, the most economical process scheme was found to be hot potassium carbonate followed by aqueous monoethanolamine ($0.11/1000 std. cu. ft.). However, the cost of treating the gas by this method was only slightly lower than three of the other schemes studied. The selection of this process can be modified by a change in the basic assumptions, such as costs or condition of the gas, made in this study.

● **In general,** it was found that the two factors which primarily determined the total operating costs were (1) the steam costs, and (2) the plant investment. Utility costs were found to be directly related to the amount of steam required for each scheme as only minor differences were established by other utilities. The plant investment, on the other hand, determines the other operating costs such as maintenance, depreciation, insurance, and taxes.

**Cost basis . . .** In order to obtain realistic investment costs for a typical plant in a typical location, complete process calculations were made for each case and all major equipment such as absorbers, strippers, heat exchangers, accumulators, knockout pots, pumps, storage facilities, etc., were sized. An experience factor was applied to the total equipment cost to obtain the approximate installed investment required for each scheme.

For purposes of this study, a gas flow of 12,000,000 std. cu. ft. per day was selected (which would be roughly equivalent to a 100-ton per day ammonia plant gas stream). This gas has 34.3 wt. per cent carbon dioxide and a molecular weight of approximately 17.

This gas was assumed to be available at a pressure of 350 psig. and a temperature of 100° F. saturated with water, except that in the hot potassium carbonate scrubbing cases the gas was available at 280° F. and saturated.

In order to establish comparative capital costs, all equipment was sized using the same basis. For instance, the same temperature approach was used for exchangers of similar types in the various processes. Consideration was also given for special alloys required in exchangers in especially corrosive services. Conventional and established good design practices were followed throughout in the selection and sizing of all of the equipment.

The utility costs listed below were selected as being typical. They were taken to include payoff of the capital investment, as well as the normal operating costs of the facilities required to provide these services.

1. Steam @ $0.55/1,000 lb.
2. Electricity @ $0.01/kw.-hr.
3. Cooling water @ $0.02/1,000 gal.
4. Process water @ $0.10/1,000 gal.
5. Gas losses @ $0.50/1,000 std. cu. ft.
6. Chemical losses @ current 1957 prices.

Other direct operating costs were set on the following basis:

1. Operating labor—Foreman, $3.50 per hour; operators, $2.75 per hour; plus 22 per cent burden to cover vacation, insurance, and other benefits.
2. Maintenance—Annually 4 per

cent of plant investment, typically 6 per cent for labor and 40 per cent material.

3. Plant general—Annually 40 per cent of total direct labor cost, includes nonoperating services and personnel up to and including plant manager.

4. On-stream time—360 days for all cases.

Indirect operating costs were assumed to be as follows:

1. Depreciation—Annually 10 per cent of plant cost.

2. Taxes and insurance—Annually 2.5 per cent of plant cost.

The yearly cost referred to as "cost of profit" is about 25 per cent of the original plant investment. This factor is used in the chemical and petroleum field to provide a reasonable plant payout and profits after income taxes.

The treating schemes used for this comparative study are shown in the flow sheets, Cases 1 to 7 inclusive.

**Comparison of process schemes . . .** The plant investments as well as the operating costs, both direct and indirect, are shown in Table 1. The last item in the table is a comparison of the costs required to treat 1,000 std. cu. ft. of gas to the purity required. On the basis of the cost figures cited above, Case 3 (hot potassium carbonate followed by aqueous monoethanolamine) has the lowest treating cost of the schemes studied, $0.11 per 1,000 std. cu. ft. Case 4, in which water scrubbing was followed by monoethanolamine treating, was only $0.01 per 1,000 std. cu. ft. more.

The highest cost in this study was $0.20 per 1,000 std. cu. ft. for Case 7 using aqueous ammonia followed by caustic. This method of treating is usually employed at lower concentrations of carbon dioxide, and has certain advantages over other schemes when various contaminants are present in the gas.

**Steam costs . . .** Inspection of Table 1 indicates that the steam costs generally predominate the utility costs and determine, to a large extent, the differences found in the utility costs. Note that the steam costs are from 58 to 87 per cent of the utility costs with the exception of Case 7 (water scrubbing followed by aqueous monoethanolamine) which was only about 10 per cent. In this case, steam was used only in the final cleanup with aqueous monoethanolamine as no heat was required in the water wash unit. In all cases, steam was used only for regenerating the solution as all pump drivers were electric. It can also be seen that the utility costs vary from approximately 30 per cent to 50 per cent of the total operating cost, again with the exception of Case 7 which was found to be about 20 per cent. It is obvious, therefore, that the utility costs are of great importance in the selection of a process scheme.

Fig. 1 presents a comparison of all cases used in this study. The total plant investment costs are shown on the left-hand side. The direct and indirect costs, as well as the total yearly operating costs, are shown on the right-hand side of this figure.

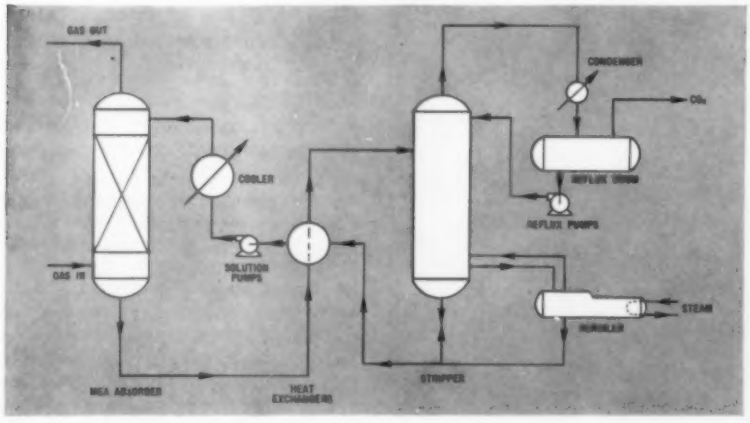
**Other factors . . .** It is clear that there may be factors other than economic ones which make it necessary or desirable to choose a different scheme. For instance, we have assumed the gas to be available at 280° F. for hot potassium carbonate scrubbing. In this study a savings was found for this process because of the smaller gas cooler and lower cooling water requirements for cooling the gas down to 100° F. This, of course, was due to the smaller gas volume after scrubbing, and the savings have been included in the cost of treating the gas. However, if the gas was not available for treating at high temperatures, the economics of treating with hot potassium carbonate would change. Cooling the gas down after scrubbing would increase capital and operating costs of this process.

**Contaminants . . .** The effect of contaminants found in some gas streams on the treating solution has to be considered when selecting a process to remove carbon dioxide. If COS, $CS_2$, etc., are present in the gas and not completely removed by the carbonate solution, they will combine with monoethanolamine to form nonregenerable compounds which will not pick up carbon dioxide, as well as increase the chemical costs of this process. Case 2 or Case 4 which uses aqueous diethanolamine, can be utilized since diethanolamine is relatively nonreactive with COS. Also aqueous ammonia treating can be employed when contaminants such as COS or like impurities are present. It is, therefore, very important that the complete composition of the gas be known so that the optimum treating solution can be selected.

**Effect of other operations . . .** Other factors which might indicate a different scheme from those included in this study might be mentioned. For instance, if dehydration as well as $CO_2$ removal was required, treating with a glycol-amine solution may result in a substantial savings of both the initial plant investment and operating costs when including the dehydration step in the cases studied. As in treating with aqueous monoethanolamine, the $CO_2$ can be reduced to

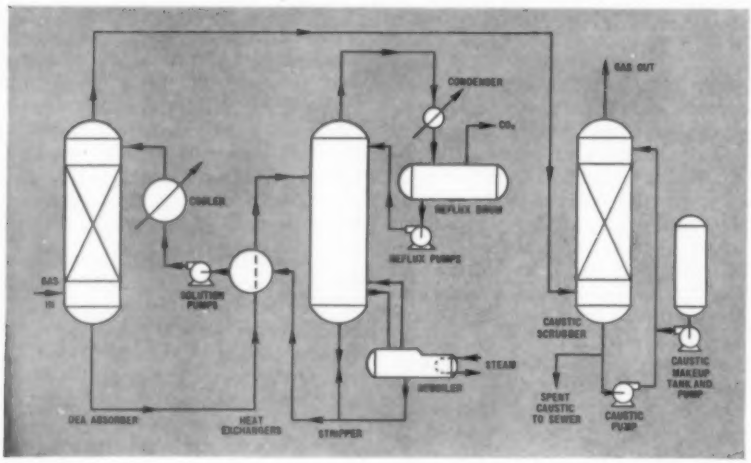
*(Discussion continued page 98)*

## Flow diagrams of the seven $CO_2$ removal methods



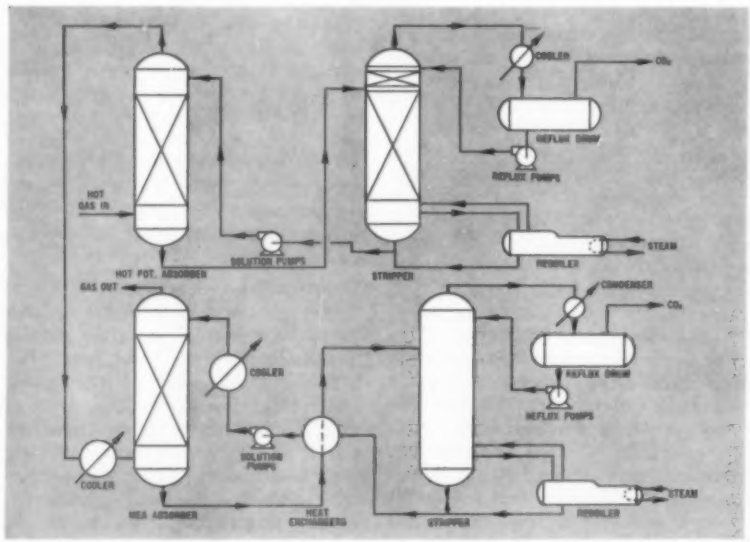

### CASE 1. Aqueous monoethanolamine

A typical aqueous monoethanolamine plant with a 15-20 per cent amine solution was designed for treating this gas. The basis used for this design was a plant which normally produces a treated gas stream below 10 p.p.m. carbon dioxide. Since this high purity is reliable and steady, a caustic plant to remove residual carbon dioxide was not included in this design.




### CASE 2. Aqueous diethanolamine followed by caustic treating

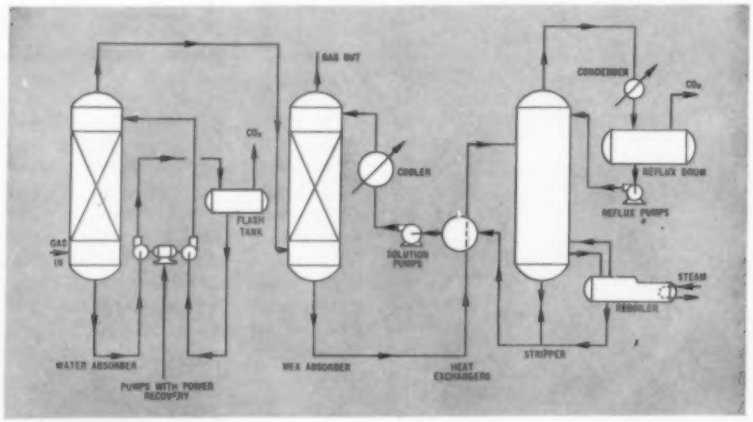
In this case, the diethanolamine treating plant was designed to produce a gas containing approximately 200 p.p.m. carbon dioxide, with a 20-25 per cent amine solution. Although the residual $CO_2$ is lower than typical refinery DEA plant would produce, it is quite easily attainable with proper allowances in design. A caustic scrubbing unit was included in this treating scheme to reduce the carbon dioxide content of the gas to the desired range of 10-25 p.p.m.




### CASE 3. Hot potassium carbonate followed by aqueous monoethanolamine

The gas at about 280° F. is treated first with hot potassium carbonate solution to remove the bulk of the carbon dioxide, and then the gas is cooled down to 100° F. for aqueous monoethanolamine treating to reduce the carbon dioxide down to less than 25 p.p.m.

The hot potassium carbonate solution reduces the quantity of carbon dioxide in the gas down to 2 per cent by countercurrent extraction with a hot solution of 30-40 weight per cent $K_2CO_3$. In this unit, as in an amine plant, the carbon dioxide is removed by chemically combining with the potassium carbonate and later released by stripping with steam. This process is different from the others studied in that the hot potassium carbonate system does not require heat exchange as usually found in other treating schemes. The gas was treated while it was about 280° F. Treating the hot gas results in considerable heat exchange savings due primarily to the high temperature level of absorption which reduces the quantity of steam required for stripping, and because of the removal of about 95 per cent of the carbon dioxide, thus saving cooling costs for the $CO_2$.



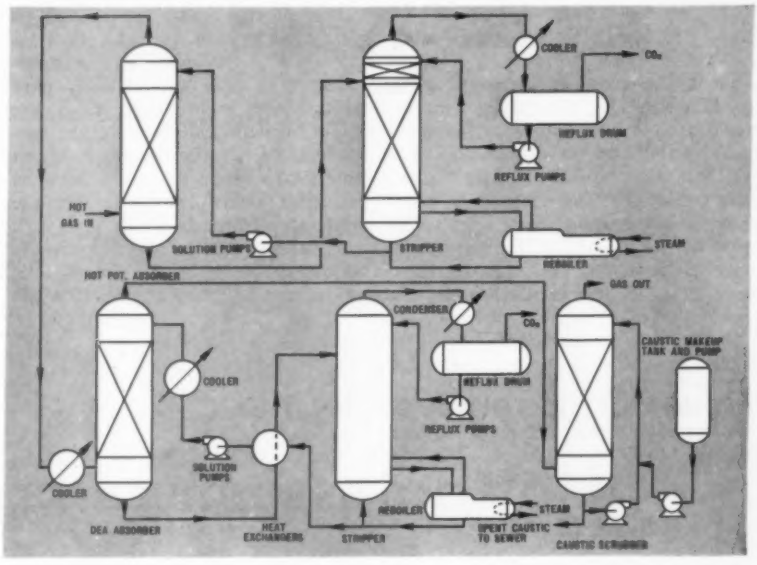

### CASE 4. Water scrubbing followed by aqueous monoethanolamine

Water has been used quite extensively in the past, mostly in Europe, to remove carbon dioxide from gas streams, and therefore warranted consideration in this study. The water contacts the gas in a typical packed absorption column which is designed to remove the carbon dioxide down to 2 per cent. The water containing the carbon dioxide is flashed at near atmospheric pressure to release the carbon dioxide and then recirculated back to the contactor. The low solubility of carbon dioxide in the water makes it necessary to circulate a large

volume of water. This high circulation requires a large amount of pumping energy. About 60 per cent of the energy required for the water circulation is recovered by means of a Pelton wheel driven by the water from the bottom of the absorber. No exchangers or regeneration heating facilities are required for this process.

### CASE 5. Hot potassium carbonate followed by aqueous diethanolamine then scrubbing with caustic

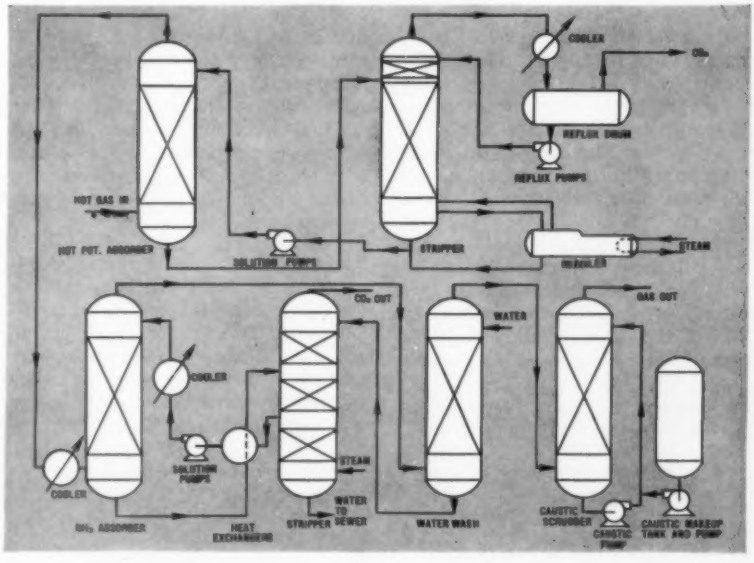
In this case, three different processes were required to obtain the gas purity specified. The gas was first contacted with hot potassium carbonate which removes the $CO_2$ down to 2 per cent, as indicated in Case 3; next, with aqueous diethanolamine to reduce the $CO_2$ to 200 p.p.m.; and then finally by caustic to produce a gas within the specified limits.




### CASE 6. Hot potassium carbonate followed by aqueous ammonia treating and caustic scrubbing

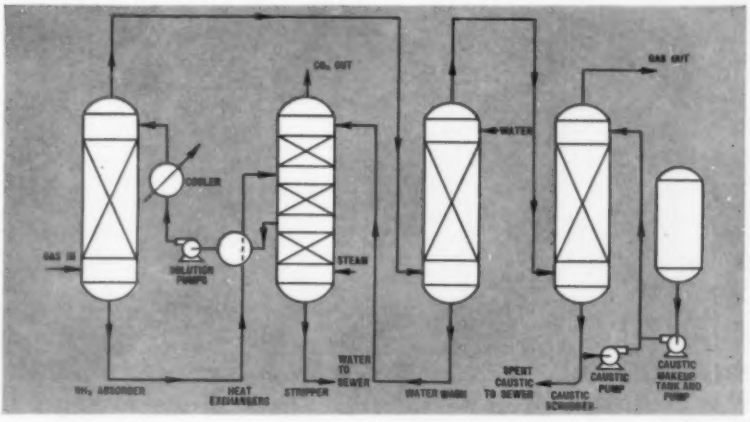
As in the previous case, the gas is contacted with hot potassium carbonate reducing the $CO_2$ to 2 per cent. An aqueous ammonia solution is then used to reduce the carbon dioxide to 150 p.p.m. and is followed by caustic scrubbing to reduce the carbon dioxide to the desired level (10-25 p.p.m.).

The new process introduced in this case is scrubbing with an aqueous ammonia solution (about 2-5 per cent ammonia). The rich or outlet solution from the contactor flows through heat exchange to a stripper which removes the $CO_2$ from the solution by stripping with steam.




### CASE 7. Aqueous ammonia followed by caustic

In this scheme the gas is first contacted with an aqueous ammonia solution in the same manner as outlined in Case 5. Here the carbon dioxide is reduced to 150 p.p.m. with the final cleanup being effected by scrubbing with caustic.



10-25 p.p.m. without caustic scrubbing by proper design methods.

**Aqueous monoethanolamine treating** . . . This is usually the preferred process because of its simplicity, as well as other advantages. The plant cost was found to be only slightly higher than the lower priced schemes studied. For gases containing lower concentrations of $CO_2$, the economic advantage found in some of the other schemes may equalize or even reverse if the carbon dioxide is to be reduced to less than 25 p.p.m. An advantage associated with aqueous monoethanolamine treating is the relatively pure carbon dioxide produced from the stripper which is important if the carbon dioxide is to be utilized as a raw material in other processes such as the manufacture of dry ice or the production of urea.

Removing $CO_2$ by water scrubbing was found to have the lowest total utility cost of the schemes studied. There may be cases in which this scheme will have an economic advantage, especially if the gas is available at high pressures and the gas losses due to its solubility in water can be tolerated.


### Acknowledgment

Process calculations were made by F. E. Miller, Fluor research division, and J. N. Akoury, H. R. Cooper, E. L. Ghormley, M. J. Seneshen and E. J. Smet, Fluor process department.


## How $CO_2$ is removed by the

# Hot potassium carbonate process

THE HOT potassium carbonate process has in the past 2 years gained widespread interest of engineers and producers in the synthetic-gas industry, natural-gas industry, and the liquid-carbonic field. The incentive in each industry is common: to produce better gas more economically. Some of the specific objectives are to recover carbon dioxide gas, to purify a gas stream, or to increase the heating value of a fuel gas.

**Present plants** . . . There are three hot potassium carbonate plants for the removal of carbon dioxide from natural gas under construction on the West Coast. Two of these units are being built by Petrocon Engineering Co.; one is for Honolulu Oil Corp., and the other is for Belridge Oil Co. The Honolulu Oil Corp. plant, located near Taft, Calif., is an addition to an existing facility. The Belridge plant is being constructed in the Compton shop and is to be skid-mounted for transportation to the field as a completed unit. This article presents some of the salient features of these two plants and some of the information developed in connection with their design.

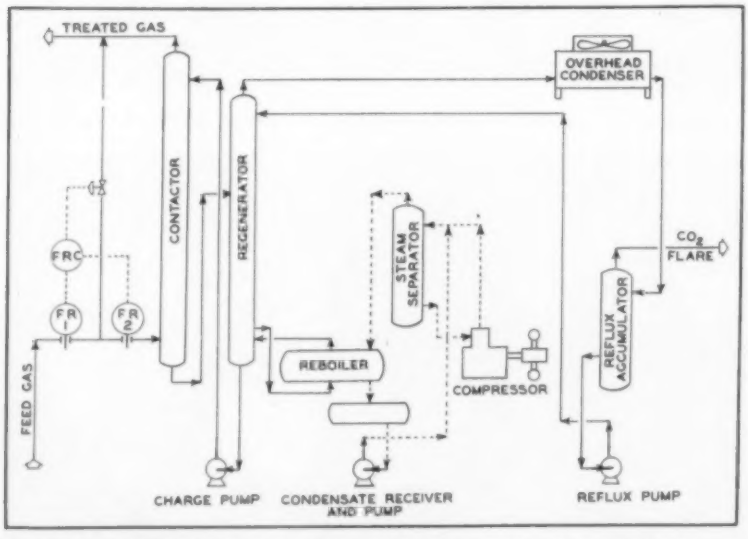

Paper presented by Petrocon Engineering Co., Compton, Calif., at California Natural Gasoline Association meeting.


**The process** . . . The technical knowledge of the behavior of potassium salts has been familiar to chemists for a long time. Before the nineteenth century, when potassium salts were cheaper than sodium salts, potassium bicarbonate made from wood ashes was used for raising bread. For centuries bicarbonate has been produced by forcing carbon dioxide under pressure into carbon solutions. To this basic concept of changing bicarbonate salt to carbonate with the generation of carbon dioxide, add the physical chemistry of the energy involved and the limits of solubility of the salts in water. The result is the basic information for application of the hot potassium carbonate process to gas treating.

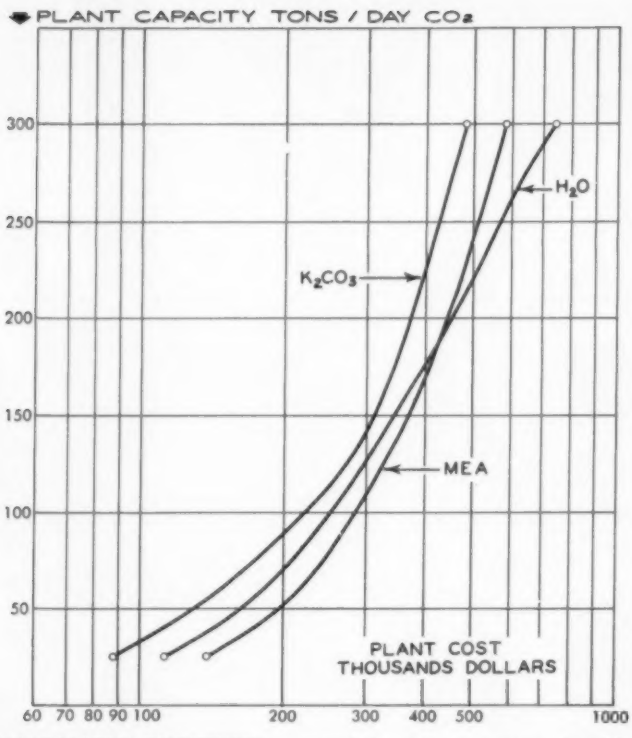
Credit for compiling the physical data relating to this process should be given to the Bureau of Mines, whose Solids to Fuels Division made extensive pilot-plant studies of the process. The bulk of information obtained by the bureau has been released in technical publications.

**Reduced plant investment** . . . The hot potassium carbonate process is similar in many respects to the monoethanolamine process. The principal difference is that the carbonate solution in contact with the gas stream is hot at the temperature of regeneration, eliminating the requirement for heat exchangers and coolers on the lean solution. This feature of the process conserves energy and reduces plant investment.

**Process scheme** . . . Briefly, the process employs a carbonate solution in the range of 20 to 45 per cent concentration. At the ordinary pressures encountered (300 to 1,000 psi.) the carbonate will absorb from 3 to 7 cu. ft. of carbon dioxide per gallon of solution. Gas enters the process hot from compression or synthesis, and is contacted countercurrently with the solution where the acid gases react with the carbonate. Rich liquid is drawn from the bottom of




**PRINCIPAL COMPONENTS** of the $CO_2$-removal plant of Honolulu Oil Co. Fig. 1.




**COMPARATIVE INVESTMENTS** required by three processes for $CO_2$ removal. Fig. 2.

the contactor and flashes into a stripper, from which the liquid is returned to the contactor as a continuous phase. The method used in stripping varies for each particular application, depending upon the utilities available. Direct contact steam, or reboilers, may be used.

**Plant features . . .** An attractive feature of the process, aside from the end point, is that the level at which heat must be added to the system allows use of heat that would otherwise be wasted in a gasoline plant. It is attractive from a maintenance point of view since inhibitors can be used successfully to control the rate of corrosion. The chemical cost is cheaper than that of most competitive processes.

The flow diagram shows the principal components of the Honolulu Oil Corp. plant. It is an addition to an existing gasoline plant, and was conceived at the time additional compressors were being added. By coincidence, the quantity of carbon dioxide being removed from the gas required regeneration heat equal to the heat lost by compressor engines to the jacket-water system. To utilize the heat that would be lost by conventional cooling, a vapor-phase cooling system is used to generate 250° F. steam for the reboiler, thus eliminating the jacket-water cooler.

To conserve water the stripper overhead is cooled before flaring the acid gas. Condensed water is returned to the process by a reflux pump.

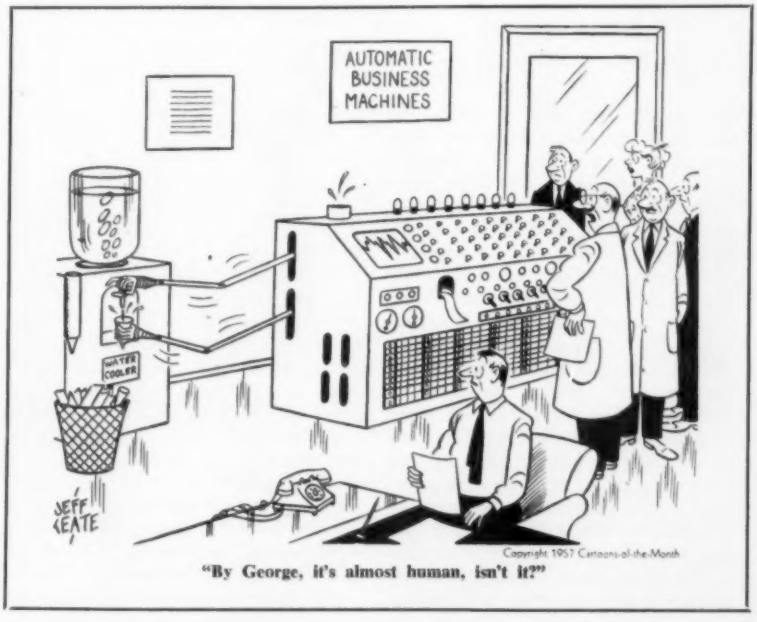
Materials of construction in the plant are largely carbon steels. Stainless-steel trim on components such as the perforated plate trays are exceptions.

**Investment costs . . .** In connection with the two plants discussed and with other plants in the engineering stage, the curves (Fig. 2) were developed showing comparative investments required by three processes for removal of carbon dioxide. The three compared are the hot carbonate, aqueous amine, and simple water absorption. The carbonate-process investment is lower because of the reduced heat-transfer equipment. Plant costs shown do not include offsite facilities since the data were developed to show each as a gasoline plant component.

Analysis of operating costs for a representative treating problem have been computed (Table 1). The case presented necessarily is selected with a carbon dioxide tolerance in the residue gas that all three processes can meet.

**TABLE 1—TREATING-COST COMPARISON, $K_2CO_3$ AND OTHERS**

| Type of plant— | $K_2CO_3$ | MEA | Water |
|---|---|---|---|
| Daily capacity, tons of $CO_2$ | 50 | 50 | 50 |
| Pressure, psig. | 400 | 400 | 400 |
| $CO_2$ per cent in inlet | 12 | 12 | 12 |
| $CO_2$ per cent in outlet | 2 | 2 | 2 |
| Prime mover, b.hp. | 111 | 59 | 700 |
| Heat demand (M.B.t.u./hr.) | 3,400 | 8,150 | 0 |
| Treating cost: | | | |
| Utilities and chemicals, cents/M.c.f. | 0.46 | 0.80 | 0.59 |
| Labor and amortization of equipment | 0.27 | 0.39 | 0.31 |
| Total | 0.73 | 1.19 | 0.90 |




**"By George, it's almost human, isn't it?"**

**SURVEY AND STAKING CREW** ride a marsh buggy across Louisiana swamp to chart a path for . . .

# Dual-purpose pipeline designed for both transport and storage of high-purity ethylene

THE NEW high-purity ethylene line built by Petroleum Chemicals, Inc., from its Lake Charles, La., plant to contract customers near Orange, Tex., had the usual headaches of Gulf Coast marshland construction. It also posed interesting problems for the engineer —from drying the line after hydrostatic testing of operation of the system at varying pressures to permit use of the line itself as storage.

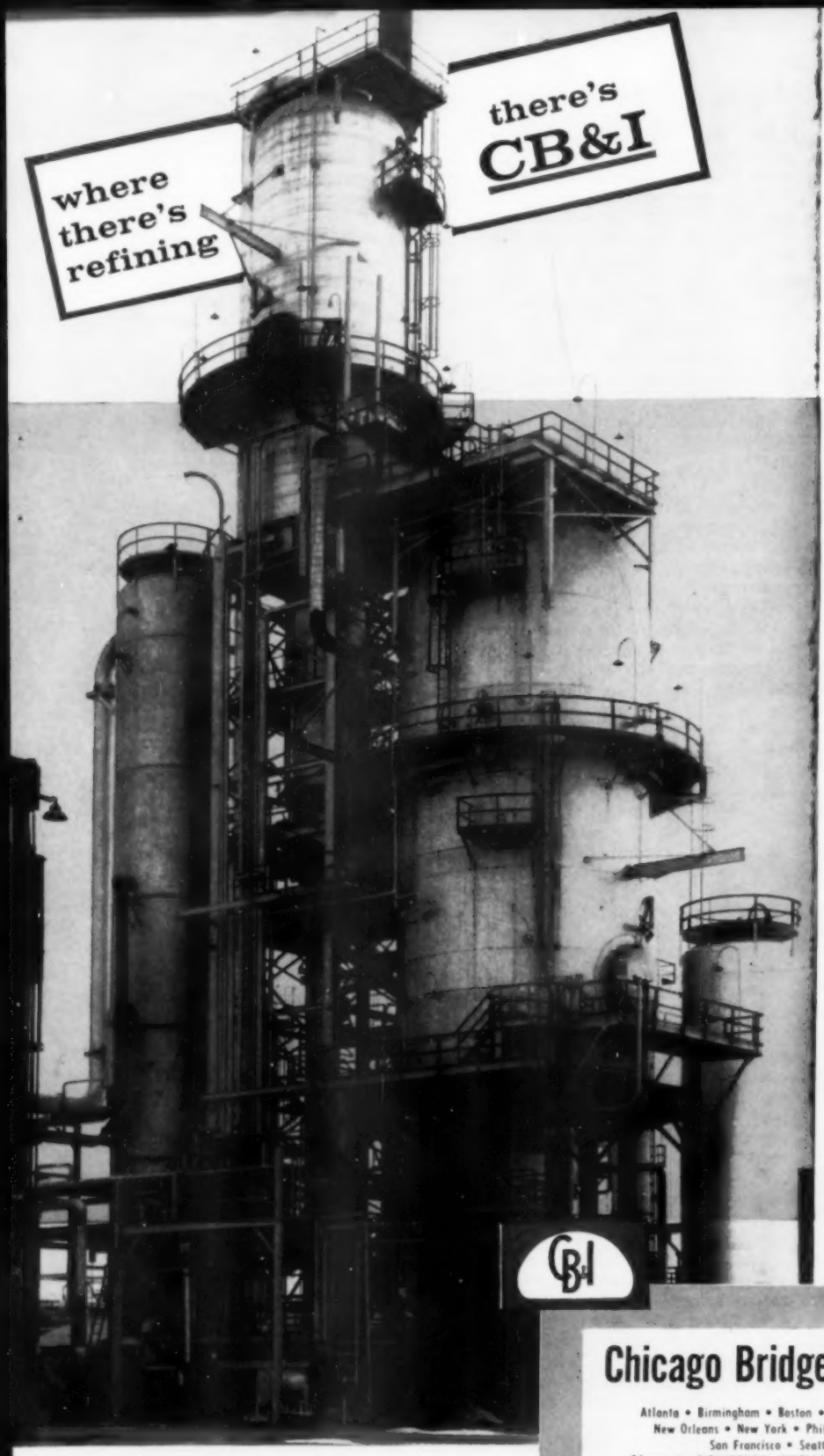
PCI's new plant will be able to produce 200 million pounds of ethylene per year by cracking gases delivered from adjacent petroleum refineries owned by the affiliated Cities Service and Continental Oil companies. Plant design will permit ready expansion to 300 million pounds per year. Lummus Co. was general contractor for the plant, which will supply ethylene to E. I. du Pont de Nemours & Co., Inc., and Spencer Chemical Co.

The pipeline has been constructed of German-manufactured pipe of 6⅝ in. o.d. and the line will operate at a pressure of 1,000 psig. although withdrawals will be made at 450 psig. or less.

Variation in pressure on this system will permit use of the pipe line as a storage facility. At times when deliveries are small the plant at Lake Charles can pack the line to 1,000 psig. and provide extra capacity for times of abnormally large deliveries or for occasions when it is desirable for the Lake Charles plant to be down for a short period of time. Such surge capacity will permit continuation of normal deliveries during these periods even though no ethylene is being delivered to the pipeline at Lake Charles.

To keep in constant touch with pressure conditions at the Orange end of the pipeline, a pressure transmitter has been installed at Orange which telemeters pressure over a leased telephone channel to a recorder mounted on the control panel in the ethylene plant at Lake Charles. To supplement this, a full-period talking channel between Lake Charles and Orange has been leased to provide contact between manufacturing and delivery points at all times.

Aerial photography was used to determine the route of the pipeline. Since the line is a private facility the problems of acquiring right-of-way had to dictate the exact route. The terrain traversed by the line is flat farm land and marsh. The line is about 30 miles in length and of this about 12 miles is marshland. It was necessary to use a marsh buggy, pontoon




Above: UOP fluid catalytic cracking unit recently fabricated and erected by CB&I at the Detroit refinery of Aurora Gasoline Company.

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sled, boats, two-way radios, and other out-of-the-ordinary equipment to stake across the marshland. A 20-ft.-high wood tower was constructed at one end of the marsh for the instrument man to see over the vegetation in the marsh and direct the line of stakes.

Nearly 8 miles of the alignment of stakes was controlled from the one tower, which is quite a distance considering visibility conditions in the Gulf Coast area. The staking operation required considerable preparation but the 12 miles of marsh was actually staked in 2 working days.

Marshland construction presents many problems not normally encountered in ordinary crosscountry pipeline construction. In some areas of the marsh the contractor was able to take stakes 14 ft. long and push them completely into the marsh with practically no effort. This created a question of possibly adding weight to the line to keep it from floating. (The specific gravity of the ooze encountered in the marsh varies from 1.10 to 1.15.)

By using pipe of ¼-in wall thickness with proper coating, a specific gravity of about 1.179 was obtained, using an empty closed line. This kept the pipe from floating in the ooze and at the same time was not so great that it might continue to sink into the ooze, which could result in additional stress in the pipe.

The Sabine River and several navigable canals and bayous were crossed by the line. The Sabine crossing was installed as a joint venture with Ohio Oil Co. which was laying two lines across the Sabine River at the same location. The river is about 45 ft. deep at its deepest point and 1,200 ft. wide at the crossing site. Three-eighths-inch-wall pipe was used for this crossing as an added safety measure.

The line was grit-blasted and given a primer coat followed by hot enamel into which was wrapped fiber glass and asphalt-impregnated felt, followed by heavy kraft paper. Because of higher temperature conditions, the initial 3,000 ft. of pipe at the plant was doped with cold mastic and wrapped with fiber-glass mesh.

Block valves were installed at intervals along the line where they are accessible. These were installed mainly for emergency use so that if a leak or line break occurs, that section can be isolated by use of the block gates. Scraper traps were installed on each end of the line and the line was hydrostatically tested to 1,500 psi. Scrapers were pumped through the line ahead of the water to expel the air from the line. After the hydrostatic test, dry natural gas was connected to the line at the plant, a scraper was launched, and the water expelled from the line by the gas.

After the water was expelled, dry gas continued to flow through the line to absorb the moisture left on the pipe walls. Scrapers were sent through the line at 5 to 10-mile intervals in order to spread out any water accumulation in low spots, affording the gas greater contact with the water surface for faster evaporation. Gas was flared at the west end through an existing flare system. Tests were taken at regular intervals on the gas leaving the system to determine the moisture content of the gas. When the line was completely dry. it was shut in and considered ready for transport.

### Operations and Metering

Although ethylene is usually priced by the pound it is actually transported and measured in a gaseous state. At temperatures of 50° F. or above and pressures of 750 psia. or lower, ethylene is always a gas. Being a gas, it is logical that an orifice meter should be used to measure the volume of ethylene delivered and this volume then converted to equivalent pounds for the purpose of price computations.

Full standby metering facilities are provided in the ethylene pipeline to avoid interruption of service, or unmetered service, while changing orifice plates or doing work of any kind on the instruments. The metering facilities consist of conventional orifice-meter runs with flange taps and bellows-type flowmeters. Differential pressure only is recorded by the flow instrument.

Static pressure is recorded by another instrument with two pens recording the same pressure on different scales on the same chart. This is done to obtain extremely accurate readings on an expanded scale of limited range, centered on the desired metering pressure. This provides an additional full-scale reading to be used if and when pressure should be above or below the range of the expanded scale. Temperature, for use in flow calculations, is measured by a resistance-type thermometer and recorded by an electronic instrument.

Some unusual provisions were made for pressure reduction upstream of the metering facilities. The plant at Lake Charles will deliver ethylene into the pipeline at pressures up to 1,000 psig. Deliveries will be made 30 miles away at pressures of 400 and 450 psig. Pressure drop due to friction in the pipeline is small so pressure-reducing stations must be provided. The pressure reduction is accomplished in two steps: 1,000 to 500 psig. and 500 to 450 psig.

Preliminary calculations indicated that the initial pressure reduction (1,000 to 500 psig.) would result in a drop in ethylene temperature from 60° to 15° F. and under these conditions the ethylene gas would convert to about 60 per cent liquid. To compensate for the refrigeration effect resulting from pressure reduction in both steps, heat exchangers have been installed upstream of the initial pressure-reduction station. These exchangers use steam as a heating medium and raise the temperature of the ethylene to 130°-140° F. so that after pressure reduction the ethylene temperature will be approximately 60° F. This eliminates any conversion to liquid and assures measurement of ethylene as a gas at the desired temperature.

The desired temperature is measured with a resistance-type thermometer and controlled by an electronic-pneumatic recorder controller acting on a control valve in the steam line to the heat exchanger. The second of the pressure reductions permits much more accurate control of the pressure at the actual metering point.

As for orifice-meter runs, full standby facilities are provided for both primary and secondary pressure-reduction stations. Also provided are filters consisting of vessels containing a granular-type desiccant for the removal of scale or other foreign material. All of this equipment, as well as the orifice-meter runs, is designed for operation at 1,000 psig., has ring-joint-type flanges with soft-iron gaskets, and is fully insulated.

Two different methods are used in obtaining ethylene samples for laboratory analysis. With each method gas samples are collected in stainless-steel bottles. In one instance, the sample bottles are filled with water and this water evacuated uniformly over a 24-hour period, using a small laboratory pump. Gas at metering pressure fills the void created by the evacuation of the water. In the other instance a time-schedule controller is used with a small control valve to control the pressure of the gas admitted to the sample bottles. This pressure is increased uniformly over a 24-hour period from atmospheric to approximately metering pressure.

The line from the plant to the Sabine River was constructed by L. E. Farley, Inc., of Houston. The portion west of the Sabine River (about 12,000 ft.) was contracted to Bellco Engineering Co., of Houston, which in turn, subcontracted it to Farley. The Sabine River crossing was installed by Glaser Construction Co., of Lafayette, La. Doping and wrapping of the pipeline was done by the Clem A. Mayes Co., of Lake Charles.

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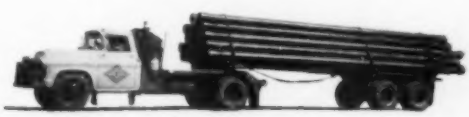

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DRILLING

## Experience in Disturbed belt demonstrates . . .

# Air drilling is possible through long intervals of open hole

### Conoco saved an estimated $100,000 on test well in this tough drilling area

BY R. E. LARSON AND OMAR PETERS, Continental Oil Co.

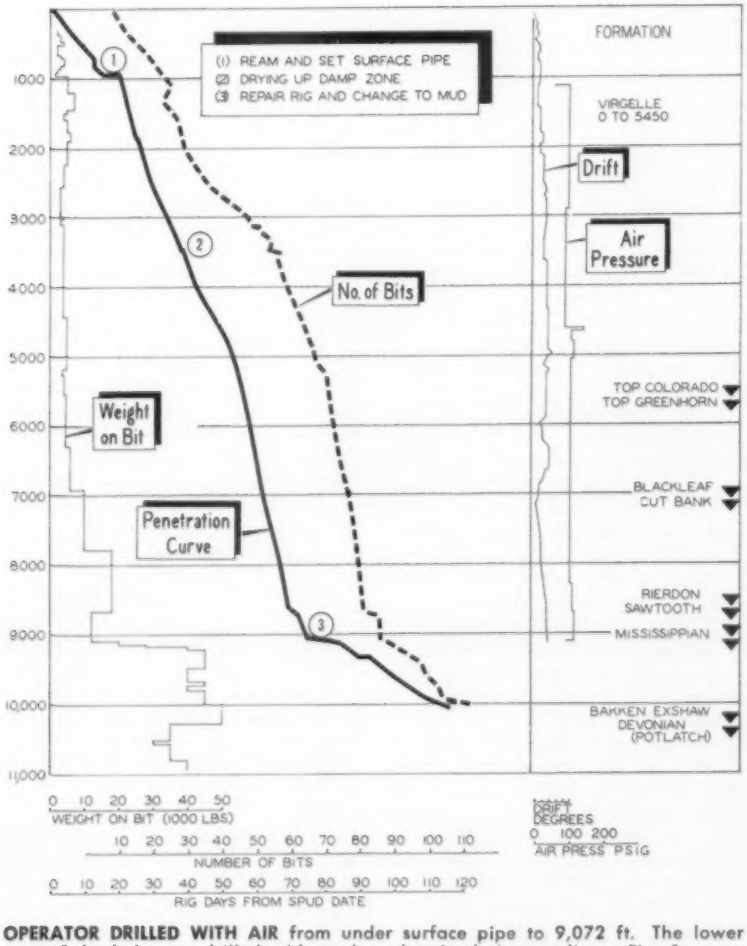
THE EAST FRONT of the Rocky Mountains in northern Montana has recently received considerable interest as an area to be explored for gas and oil. This interest was created by the discovery of fields such as Pincher Creek, Jumping Pound, and Savana Creek along the front of, and in the Canadian Rockies of southwestern Alberta.

This area extending from Canada southward into northern Montana is commonly known as the Disturbed belt; the term is derived from the complex folding and faulting which is common along the eastern front of the Rocky Mountains.

Geophysical surveys show that much of the complicated surface disturbance dies out with depth. Rocks of Mississippian age are little affected by the faulting and folding. The Mississippian and older rocks at depth in the range of 9,000 to 10,000 ft. are the main possible producing zones; therefore, wells drilled in that area are generally projected as tests to those depths.

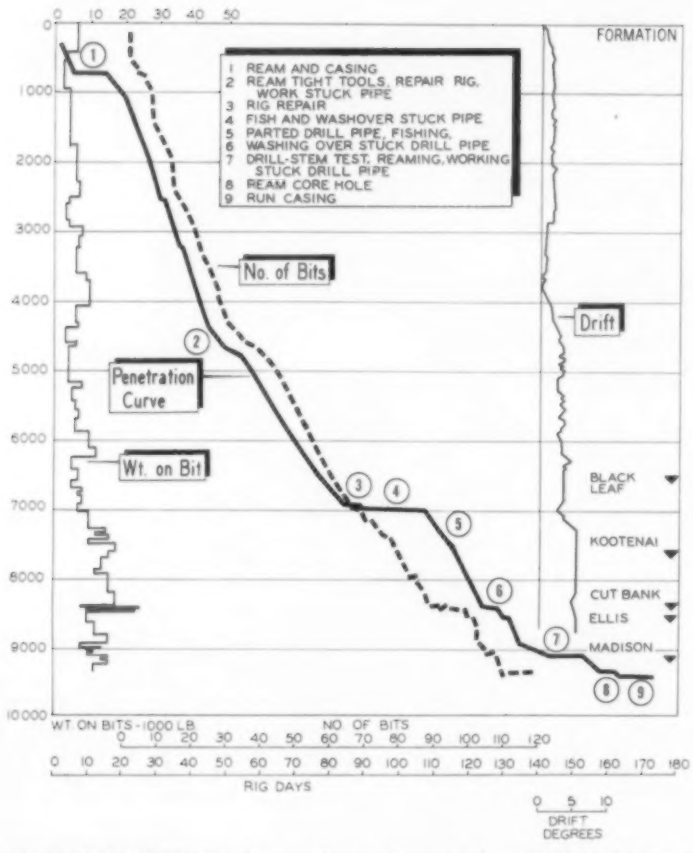
Drilling along this trend presents a number of problems which are caused by the deformation of the younger beds. The steep dips cause rapid hole deflection if the weight on the bit is sufficient to give adequate penetration rates. The crooked holes can cause much trouble by creating key seats and attendant sticking of pipe. Light weight on the bit results in drilling straight hole but greatly reduces the penetration rate. This reduced penetration rate greatly lengthens the time required to drill the well and by doing so, increases the risk of a serious fishing job. All wells drilled to date have had to spend 5 or more days fishing for stuck drill pipe. Other drilling troubles are lost circulation, stuck pipe, and sloughing hole conditions.

Normal drilling procedure is to set 400 to 700 ft. of 13⅜-in. surface pipe, drill 12¼-in. hole to between 6,000 and 7,000 ft., or below the disturbed zone, set 9⅝-in. casing and drill on to completion.




**OPERATOR DRILLED WITH AIR** from under surface pipe to 9,072 ft. The lower part of the hole was drilled with mud as the circulating medium. Fig. 1.

**Location developed . . .** Continental Oil Co., after intensive seismic and geological work, developed a location for drilling an exploratory well in NW NW SW 7-34n-11w, Glacier County, Montana. This was a structural high on the Mississippian forma-




**CONTRACTOR USED MUD** from surface to total depth on Well "A," located 20 miles south of the 1 Blackfeet Tribal, also in the foothills belt. Fig. 2.

tion. It was overlain by a thick section of highly faulted and steeply dipping younger beds. The seismic information indicated that the disturbed zone would extend to approximately 5,000 ft. and several thrust faults would be crossed. Below 5,000 ft. it was anticipated that the section would be normal and the dips would be relatively flat.

Informatica obtained from other operators indicated that the well would be quite costly and would probably require 6 to 8 months to drill. The original drilling plan drawn up for the well was similar to that used by other companies and included an intermediate string of 9⅝-in. casing to be set at approximately 7,000 ft. Because of this high cost, plans were made to attempt to drill the well, after setting approximately 1,000 ft. of surface casing, with air as a circulating medium. Continental Oil Co. had previously successfully used air in drilling wells of 3,000 to 5,000 ft. in depth in the Raton basin of Colorado and New Mexico and in the vicinity of Lance Creek field in Niobrara County, Wyoming.

**The decision to use air drilling** was made despite the fact that the log of the nearest well showed many sands ranging in thickness up to 300 ft. in the top 5,000 ft. of the well. The reason for deciding to drill with air was based on the fact that penetration rates while air drilling are greater for the same weight on the bit than while mud drilling. The tendency of a hole to drift is mainly a function of weight on the bit; therefore, faster and straighter holes could be drilled with light bit weights. It was also reasoned that most of the sands should be free of large volumes of liquids and therefore would not hinder air drilling as they could be dried up by circulating air. In the event sands bearing large volumes of water were encountered, it would be necessary to change over to mud drilling.

The revised drilling plan called for drilling out from under surface pipe with a 9-in. bit which would be used to the mud-up point. After the well was mudded up, the 9-in. hole was to be reamed to 12¼-in. and drilled to the casing point at about 7,000 ft. In any event, the revised plan still provided for a string of 9⅝-in. casing to be set as above. Hole drilled below the intermediate casing shoe was to be drilled with mud.

The primary purpose in drilling with 9-in. bits was to assure a great enough return velocity to keep the hole clean. Use of larger bits would have greatly increased the number of air compressors required and would have made air drilling economically unfeasible.

**Equipment used . . .** The contract for drilling this well was let to Will I. Lewis Drilling Co. of Denver.

Drilling equipment used was a draw works nominally rated for drilling from 7,000 to 10,000 ft. The rig was powered by three diesel engines rated at more than 300 hp. each. These engines were compounded to operate the slush pumps, draw works, and rotary table. Two pumps (7¼ by 18 in.) were provided by the contractor for use during mud drilling. The rotary table was a 20½-in. unit driven by draw works. Drill pipe was hoisted and racked in a 133-ft. mast.

The drilling string consisted of new 4½-in.-o.d. 16.60-lb. per ft. drill pipe. Drill collars used were nominal 6½-in. o.d. Rock bits were used throughout the entire air drilled section.

**Blowout-prevention equipment** is an extremely important accessory on any air-drilled hole. In this instance two blowout preventers were used. Conventional circulation was used during the greatest part of drilling this well. Returned air laden with cuttings was diverted into the blow line by a rotating packoff head.

**Five air compressors** rented from Air Drilling Services, Inc., at Casper, Wyo., were each rated at 655 cu. ft. of free air per minute at sea level with maximum operating pressure of 350 psi. Diesel engines rated at 225 hp. operated the compressors. No air-metering equipment was used but by arbitrarily down rating the compressors to 600 cu. ft. per minute, because of altitude, the normal circulating volume would be approximately 3,000 cu. ft. per minute or 4,320 M.c.f. per day.

Cuttings were diverted by the rotating head into a 7-in.-o.d. blowline which exhausted to the atmosphere 200 ft. from the rig. A kerosine-fired flare pot, such as is used by construction companies for night warnings, was kept burning at the end of the blowline in the event gas or oil was unexpectedly encountered.

**Drilling procedure . . .** The well was spudded in surface formation of gravel and shale. After 12¼-in. hole was drilled to 75 ft. the hole was reamed to 20 in. Twenty-inch conductor pipe was set at 45 ft. and cemented with

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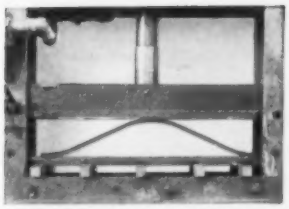
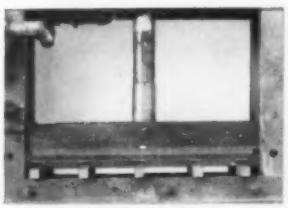
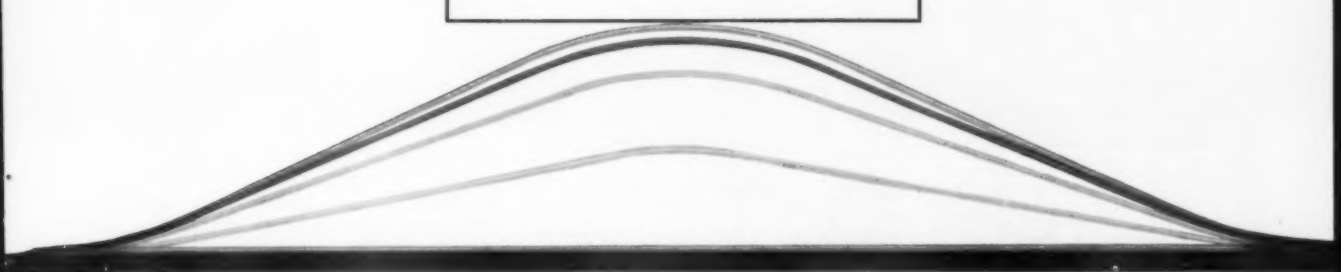


Spring in position in hydraulic press for flattening test.



The tightest hole could not flatten any spring more than this.

The specified bowed height (reach) must be present after the slight permanent set.



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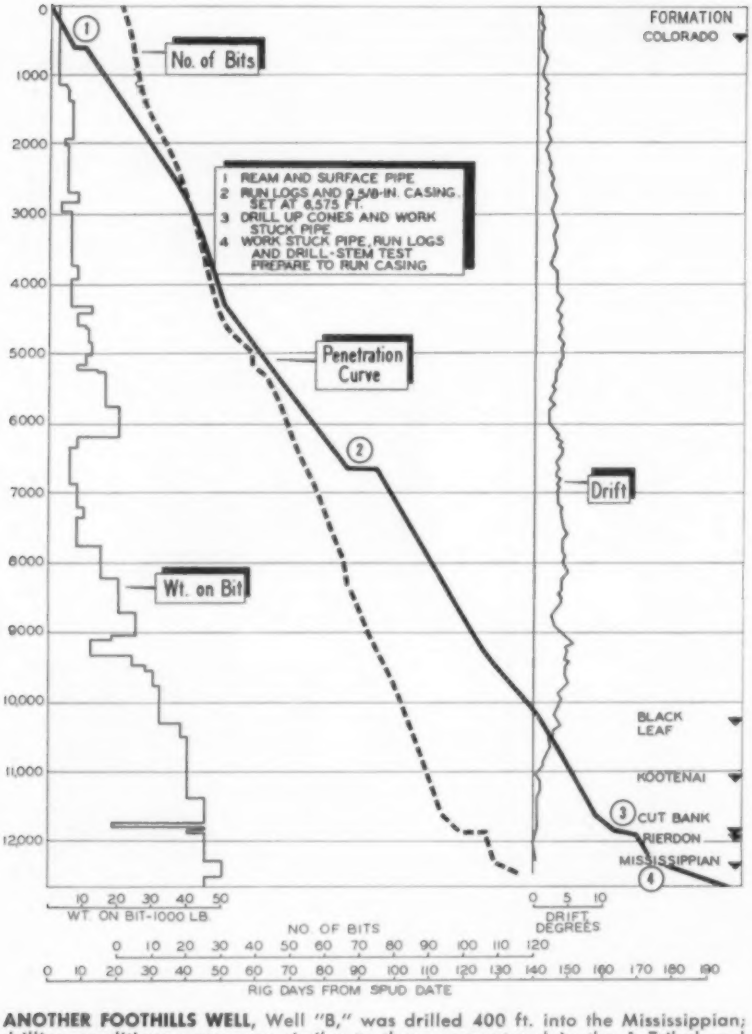
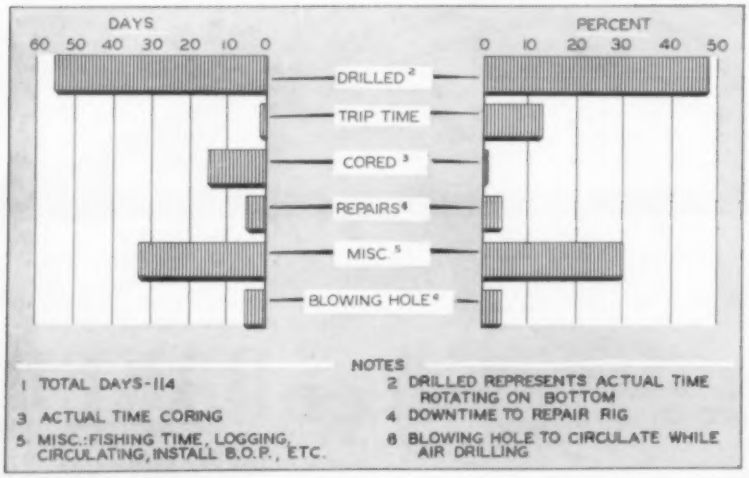



**ANOTHER FOOTHILLS WELL,** Well "B," was drilled 400 ft. into the Mississippian; drilling conditions were very similar to those encountered in the 1 Tribal and in Well "A." Fig. 3.




**ANALYSIS OF DRILLING** of the 1 Tribal shows that 55 per cent of the total time was spent on bottom, drilling ahead. Fig. 4.

25 sacks. The hole below conductor pipe was drilled with 12½-in. bit and light weight in order to hold the deviation at a minimum. The tendency of the hole to drift was quite pronounced. In order to keep as nearly vertical as possible the well was drilled with small bits and then reamed to 17½ in. This procedure resulted in drilling to 930 ft. with a maximum deviation of 1° from vertical.

After 13⅜-in. surface casing was set at 930 ft., the mud was displaced with water and the hole was blown dry with air. A 9-in. hole was drilled below surface casing with 6-7¼-in. o.d. drill collars, 6,000 to 7,000 lb. weight on bit, rotary table speed of 140 r.p.m. and air pressure of 90 psig. with a circulation rate of 3,000 cu. ft. per minute. An all-metal stabilizer was used to prevent rapid changes in hole deviation which in turn might cause dog legs or key seats.

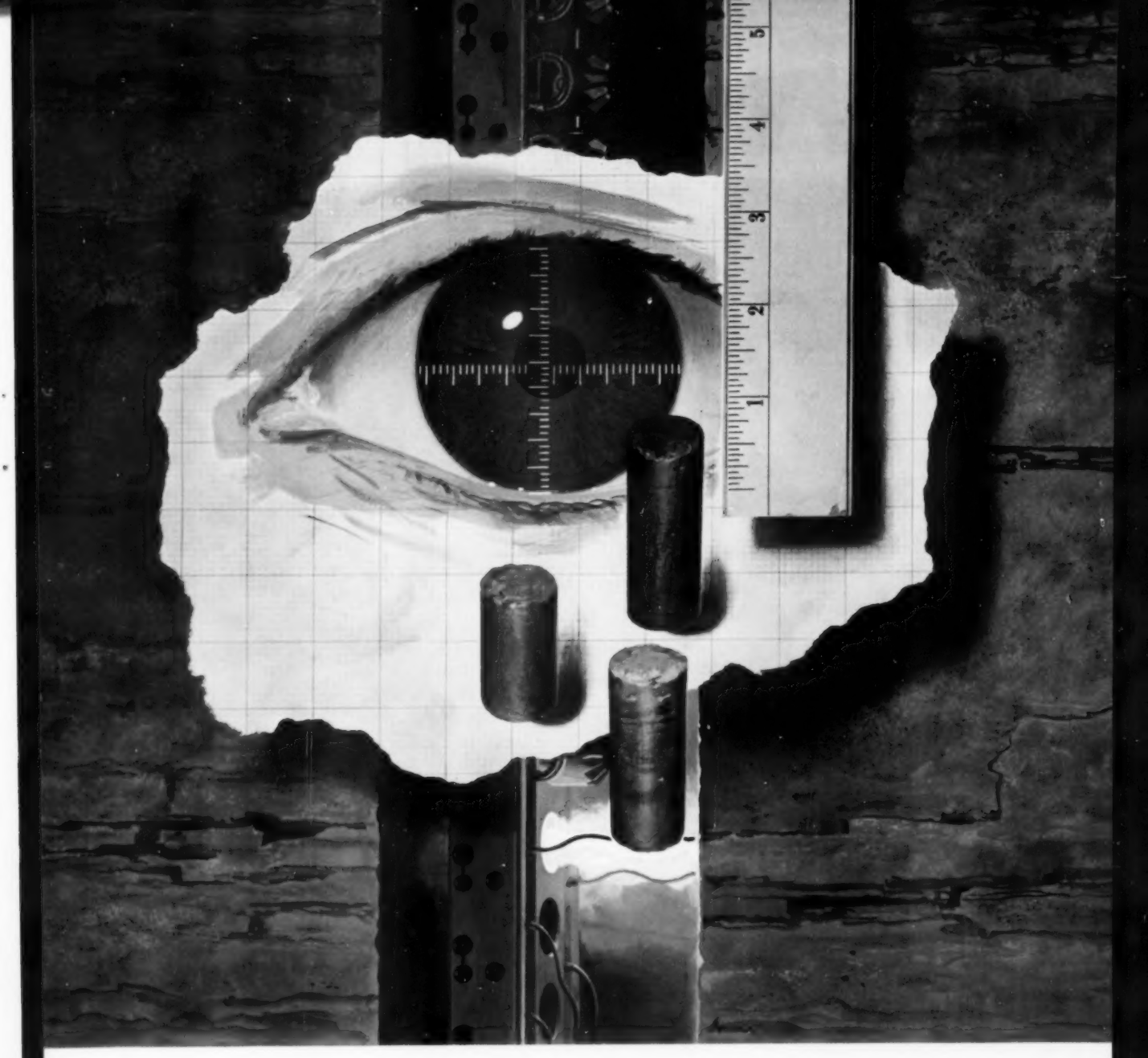
It was previously mentioned that an intermediate string of 9⅝-in. casing was to be set at approximately 7,000 ft. When this depth was reached and no hole troubles had been encountered, it was decided to drill with air to the Mississippian before mudding up. This would eliminate the time necessary to ream to 12¼ in. and run the casing. This final plan was followed and the well was drilled to 9,072 ft. with air. After mudding up, the 9-in. hole was then carried to total depth of 10,942 ft. in the Devonian formation. The time required to drill this interval minimized hydration of the shale sections and consequent sloughing.

The following comments will be of interest and value to other operators who might be considering the use of air drilling.

Air drilling was primarily resorted to in order to achieve a straight hole and a better penetration rate than was possible using a mud-circulating system. At times the penetration rate was sacrificed to maintain straight hole. The straight hole was held by use of light weight on the bit and by use of three-cone bits with one cone removed by cutting off the shank. The eccentric action of the bit assisted in holding the hole straight. An all-metal stabilizer was run on top of the bottom drill collar. A rubber stabilizer was run but it proved useless because it was torn up by sharp shelves of resistant sandstone while being run into the hole.

**Rotary table speeds** were 150 r.p.m. to 3,500 ft., 120 r.p.m. to 5,000 ft., and 85 to 90 r.p.m. to 9,072 ft.

**Broken pipe examined . . .** Because the drill pipe was new there was considerable concern when the pipe part-



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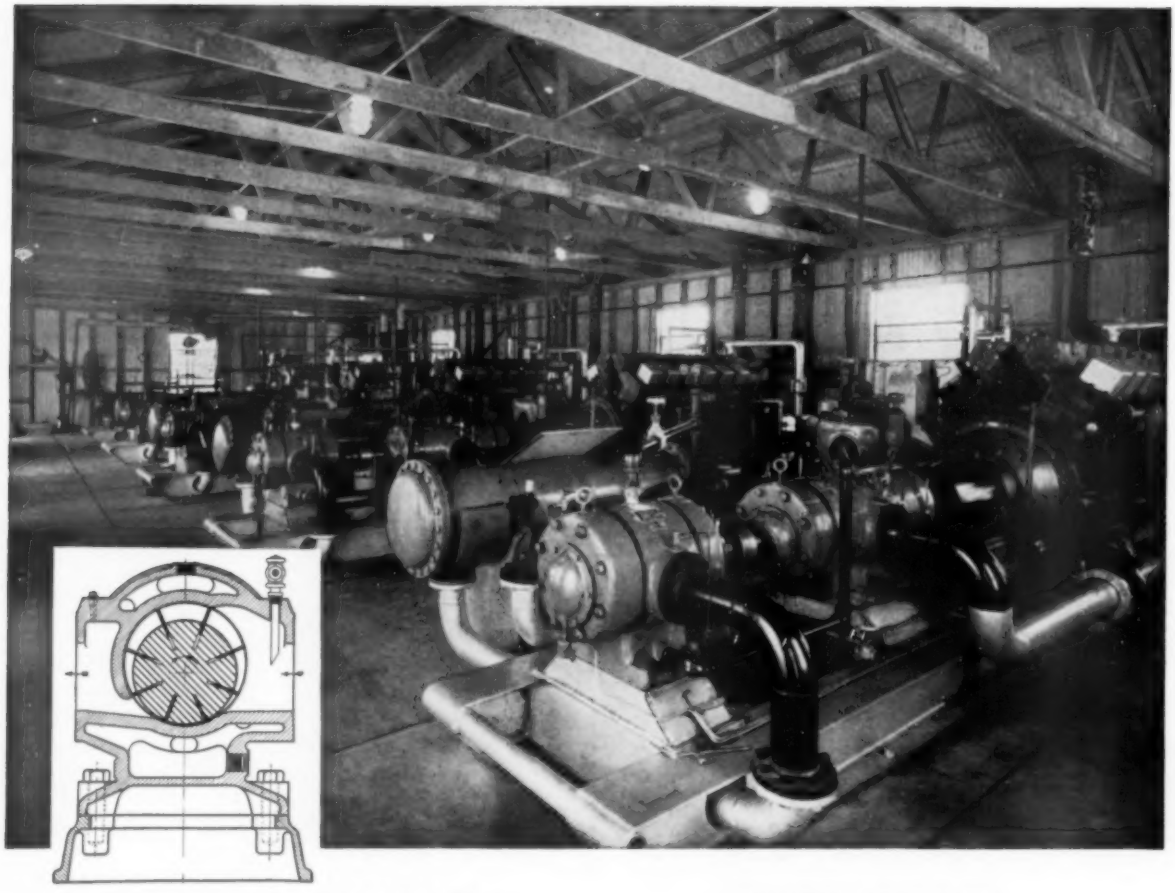

Here, near Borger, Texas, is an installation of five two-stage Fuller Rotary Booster Compressors whose total capacity is 8,875,000 SCFD of casinghead gas compressing from 10 PSIG to 125 PSIG.

This same type of Fuller Rotary is used to boost gas into main booster stations and can be, and is, used where field pressures drop due to depletion. This latter use avoids expensive construction and increasing line sizes.

These, and other Fuller Rotary Compressors, now in widespread use throughout the petroleum industry, both indoors and out, incorporate trouble-free design that assures their dependability.

### SIMPLICITY

The elimination of compressor valves, crankshafts, pistons and numerous other moving parts greatly reduces the need for attention, adjustment and replacement.

### PULSATION—FREE FLOW

The smooth flow resulting from rotary compression eliminates pressure fluctuations and simplifies metering problems.

### SUSTAINED PERFORMANCE

The blades are held out by centrifugal force, automatically compensating for wear, thus maintaining new-machine efficiency and/or capacity.

### OPERATION WITHOUT VIBRATION

The rotary principle permits a compressor design completely free of reciprocating parts, thus avoiding the basic source of vibration.

The complete details, as well as sizes, of Fuller Rotary Compressors and Vacuum Pumps are available in Bulletin C-5A. We'd like you to have a copy. Send for it.

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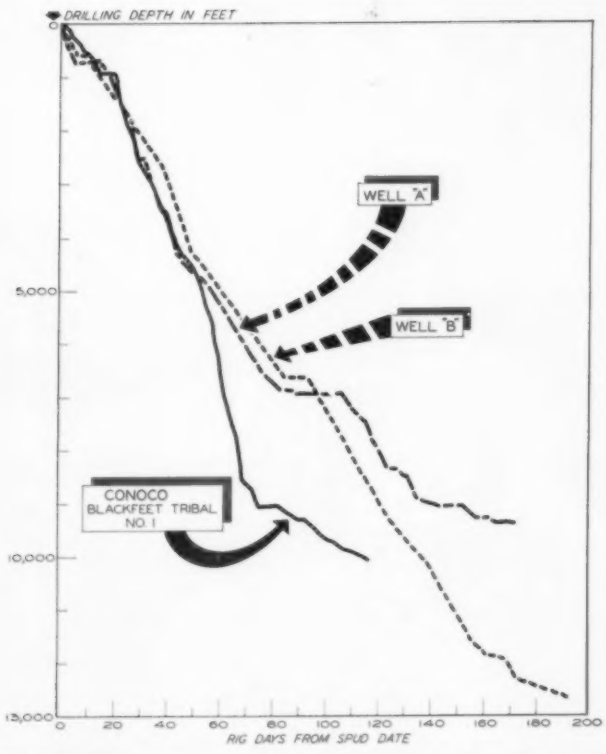
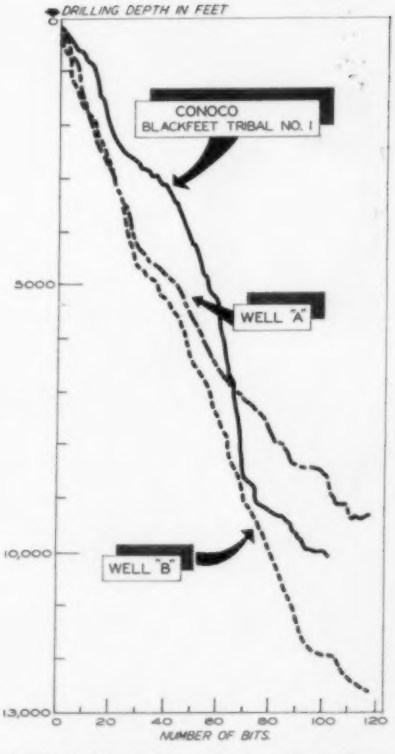



**AIR DRILLING** effected a substantial savings while drilling the 1 Tribal, with total drilling costs of $29.35 per foot. Well "A" cost $41.52 per foot, and Well "B" cost $43.24 per foot. Fig. 5.




**TOTAL NUMBER OF BITS** for each well was almost the same, but average footage per bit on the 1 Tribal was much better, 160 ft. compared to 86 and 110 ft. for Wells "A" and "B." Fig. 6.

**TABLE 1—COMPARISON OF DRILLING DATA**

| | Conoco Blackfeet Tribal No. 1 | Well "A" | Well "B" |
|---|---|---|---|
| Number of days from spud to drilling of plug under surface pipe | 20 | 14 | 10 |
| Number of bits to surface pipe depth* | 13 | 6 | 3 |
| Number of days from under surface to top of Mississippian | 54 | 142 | 174 |
| Number of bits from under surface to top of Mississippian | 57 | 96 | 106 |
| Number of days from spud to TD | †116 | 173 | 193 |
| Total number of bits used‡ | 102 | 107 | 106 |
| Average penetration per day from under surface to Mississippian | 187 | 58 | 68 |
| Average footage per bit from under surface to top of Mississippian | 160 | 86 | 110 |
| Average penetration per day from spud to TD | 87 | 54 | 66 |
| Average footage per bit from spud to TD | 98 | 84 | 120 |

*Does not include bits used for reaming. †Total depth in this well has been for comparison taken to be 10,050 ft. ‡Does not include reaming bits and core heads.

ed seven times in drilling from 930 to 5,000 ft. Specimens of the broken sections of pipe were sent to Continental's metallurgical laboratory in Ponca City, Okla., for examination.

At this time the rotary-table speed was reduced to 85 r.p.m. No additional pipe failures were experienced after reduction of table speed. The laboratory report on the failure was that the pipe failed through fatigue concentrated at a notch resulting from damage to the pipe. The origin of the damage to the pipe is not known but it was probably a slip cut or improper application of the tongs. The failure could have been aggravated by the lack of cushioning by the mud.

Air drilling is detrimental to drill-pipe float valves which are used to help control the well in case high-pressure gas and oil are encountered. It was necessary to inspect and repair the float valves each time a trip was made.

To keep an adequate volume of air passing through the bit, it was necessary to remove the water courses from the bit. This is particularly true when using low-pressure air. A large volume of circulating air was required to provide sufficient velocity to lift the cuttings. The larger air volume also assisted in more rapid drying of damp zones in the well bore.

A number of sands containing small amounts of water were penetrated. When these sand zones were encountered, care had to be exercised that the pipe was free at all times and that air circulation was constantly maintained. Dust from the cuttings had a tendency to build up on the wall of the hole and on the drill collars when drilling such zones. This buildup can become great enough to stop passage of the drill collars and the bit. This

Methods for making a new antiknock compound are investigated by an Ethyl research chemist.

# How Ethyl Chemical Research Advances Antiknock Technology

*Break-throughs in Organo-Metallic Chemistry Point to More Effective Antiknock Agents and New Tetraethyllead Production Methods*

EVER SINCE the discovery of tetraethyllead as the first practical antiknock additive, Ethyl scientists have been searching for even more effective and economical antiknock agents.

Extensive research on both organic and metal-organic materials in our Detroit Research Laboratories has shown that the metals are the most promising. Our research also has shown that these materials promise important new advances in tetraethyllead production methods.

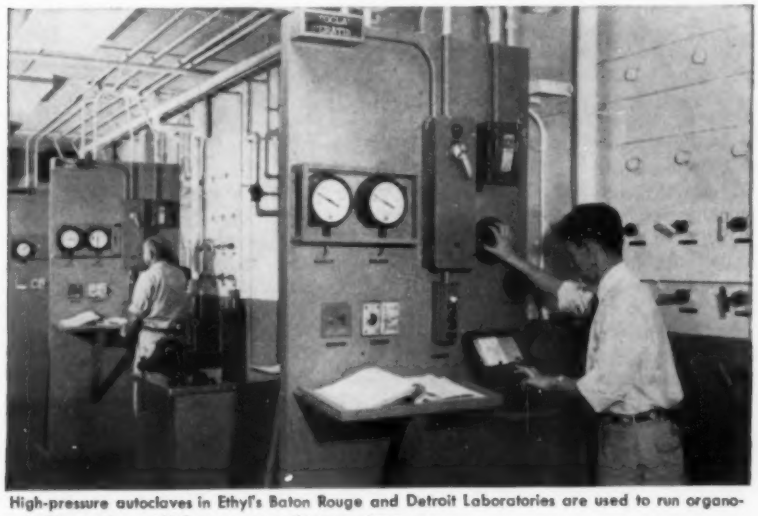
Our efforts to learn more about organo-metallic compounds also have enabled us to make significant contributions to chemical knowledge outside the antiknock field. Ethyl's continuing publication of such information contributes to the expansion of knowledge in this field of chemistry.

### Developments in Organo-Metallic Chemistry Offer Antiknock Promise

Much of the early work on metallic antiknocks was hindered by the lack of compounds with solubility, volatility, and stability characteristics suitable for use in gasoline.

Recent chemical break-throughs, used to good advantage by Ethyl scientists, have indicated that many metals might be incorporated in organic compounds. The synthesis of organo-metallic compounds with suitable physical characteristics has enabled us to consider a number of them as antiknock possibilities.

One organic manganese compound, which we call AK-33X, has shown promise as an aviation fuel constituent to increase the power of piston aircraft engines. It is now undergoing extensive testing in both aircraft and automotive engines. Many oil companies are thoroughly examining AK-33X to determine its effectiveness as an antiknock and as a supplement to tetraethyllead in their different motor gasolines and constituents.



High-pressure autoclaves in Ethyl's Baton Rouge and Detroit Laboratories are used to run organo-metallic reactions at high pressures and temperatures.

### Tetraethyllead Is Synthesized From Common Lead Compounds

Another recent accomplishment of Ethyl's organo-metallic research is a new method of synthesizing tetraethyllead from a wide range of organo-metallic compounds by reacting them with common lead compounds such as lead oxide, lead sulfide, and lead dioxide. This radical departure from present technology circumvents the use of sodium and chlorine.

Major development work remains to be done before this new method can be used commercially. However, our studies of all phases so far have led us to believe that considerable advances in tetraethyllead production methods are within reach.

### Chemical Contributions Outside Antiknock Field

An added benefit of the synthesis of tetraethyllead and other organo-metallic compounds is the development in our laboratory of improved techniques for manufacturing triethyl aluminum. This compound is of high interest as a possible new route to the manufacture of tetraethyllead.

Triethyl aluminum also is important as an ingredient in catalysts for olefinic polymers and particularly high density polyethylene, as an alkylation agent for active metals and less active salts, and as a reducing agent comparable to lithium aluminum hydride. Triethyl aluminum and trimethyl aluminum also are being considered for military fuel applications.

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The Ethyl scientific team has a solid research background in fuel-engine relationships plus a comprehensive knowledge of organo-metallic chemistry.

In addition, the Research Laboratories are uniquely organized to evaluate the potential engine applications of new fuel or lubricant additives. These are good reasons why we look forward to even more important advancements in the fields of antiknock chemistry and organo-metallic research.

In so far as possible, data on all Ethyl's current research projects in antiknock technology and organo-metallic research will be made available to the Oil Industry.


# How Ethyl Research is helping you

In the 36 years since the discovery of tetraethyllead as the first practical antiknock additive, Ethyl's search for new antiknock agents has continued.

New compounds and their value to the Petroleum and Chemical industries are investigated on a continuing basis in our laboratories in Detroit, Mich. and Baton Rouge, La.

Research in the field of organo-metallic chemistry is only one of the many facets of Ethyl's research program.

Ethyl's scientific manpower, experience and facilities are dedicated to the search for fundamental knowledge of the behavior of fuels and engines, guided by the needs of the Petroleum Industry.

**ETHYL CORPORATION**
New York 17, N. Y.

ETHYL ANTIKNOCK COMPOUND — ETHYL CORPORATION

**RESEARCH LABORATORIES:**
1600 W. Eight Mile Road, Ferndale 20, Mich.
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P. O. Box 341, Baton Rouge, La.

situation can be best prevented by drilling slowly and letting the air dry out the dust and move it up the hole. Dampness in the hole can be determined by the damp feel of the dust and by diminishing dust returns.

**Bad weather . . .** Much of the air drilling was done during rainy and foggy weather. When this damp air was compressed, the moisture-carrying power of the air was reduced and this materially reduced the drying ability of the air. The use of a scrubber or other means of removing moisture from the compressor discharge would be of material benefit and would improve operating efficiency.

The wear on stripper rubbers in the rotating head was of major importance. It was necessary at all times to keep oil in the bowl above the stripper rubber. However, this did little to reduce the wear. Pulling the dry drill pipe through this rubber caused excessive wear as there was no method of lubricating the pipe while passing through the rubber. Consideration should be given to some method of lubricating the pipe while making a trip.

Another source of minor trouble was the tendency for the dust to cake in the discharge from the rotating head into the blowline. This caking would reduce the cross-sectional area of the blowline and impose a back pressure on the annulus thus reducing the annulus air velocity.

One surprising feature of this air drilled hole was the **hole enlargement encountered.** A caliper log of the lower portion of the well showed the hole diameter to be as great as 16 in. and in no place was the diameter at bit gage. This hole enlargement apparently persisted throughout the entire air-drilled section because when the well was mudded up, the volume required to fill the hole was 1,850 bbl. whereas a gage 9-in. hole would require approximately 800 bbl. The average diameter of hole required to contain 1,850 bbl. of mud would be in excess of 14 in.

While air drilling, there is always the possibility that high-pressure oil and gas zones might be encountered. High-pressure oil and gas in such a well would be a hazard to men and equipment. This well was equipped with two blowout preventers to control any flows which might be encountered. In addition, the rig mud pits with a capacity of 750 bbl. of mud were kept full and the mud pumps kept in standby order. An additional 750 bbl. of mud was stored.

The foregoing has been a brief resume of air-drilling operations in what is probably one of the longest continuously air-drilled intervals to date. This discussion cannot by any means cover all of the features to be considered in air drilling, but it does cover most of the more important problems. It is emphasized that air drilling in this well was mainly to combat the crooked hole and slow penetration rates normally associated with mud-drilled wells. No experimenting with rotating speeds, weight on bit, or air volumes was attempted. It is probable that the penetration rate could have been increased by applying more weight to the bit, but satisfactory results were being achieved without experimenting with these factors. Attempts to obtain greater penetration rates can be made on other wells which undoubtedly will be drilled soon, if not by Continental Oil, by other operators.

**Comparison with other wells . . .** Two other wells drilled close to this well are used for comparison to determine the efficiency of the air drilling. Well "A" was drilled approximately 20 miles south of this well. Well "B" was drilled approximately 25 miles northwest. Both of these wells were drilled approximately 400 ft. into the Mississippian while the Continental well was drilled into the Devonian. For comparison purposes the depth of 10,050 ft. in this well, which is nearly through the Mississippian, was used for comparison.

Figs. 1, 2, and 3 illustrate the depth versus: weight on bit, penetration by days, number of bits used, drift in degrees, compressor discharge pressure, and formation tops. The most important features developed from these curves are shown in Table 1 and Figs. 5 and 6.

From the foregoing analysis it is easily noted that penetration rates were higher, bit runs were longer, and straighter hole was drilled when using air as compared to mud. On the basis of these criteria, air drilling offers advantages over mud drilling in areas where it is feasible.

**Cost . . .** The final analysis of any undertaking by an organization in this country of free enterprise is the ever-present question, "How much did it cost?"

The cost to drill the Continental well to a depth of 10,050 ft. was approximately $295,000. This includes the cost of abandonment at this depth. Well "A" cost $390,000 to drill and abandon to a depth of 9,392 ft. Well "B" cost $550,000 to drill and abandon to a depth of 12,920 ft. Excluded is the cost of the production string used for testing.

Mud costs for each of the above wells respectively was $12,200, $28,000, and $18,000. Air drilling resulted in a savings on mud costs but compressor rental, operator, trucking, and fuel costs were $51,300. The total costs per foot for drilling these wells were $29.35, $41.52 and $43.24 respectively. Thus, in spite of the high compressor cost the faster penetration rate and the absence of costly fishing jobs resulted in an over-all saving.

Based on these cost data it is apparent that air drilling in this instance was scientific and economic success.

**Running of samples . . .** Air drilling is not popular with the wellsite geologist who is assigned the task of maintaining the log of formations penetrated. There are several reasons for this.

The cuttings blown to the surface appear almost as a fine dust. Because of this fineness, it is difficult to determine their original identity or size. This is particularly true of sands and siltstones as all particles are reduced in size to that of silt by abrasion.

Changes in lithology were quite difficult to detect from the samples. There was considerable lag in some of the samples and much contamination from formations above. This contamination results from hole enlargement by abrasion of the cuttings.

One other difficulty was the contamination of the samples with lubricating oil which leaked into the well from around the stripper rubber in the rotating head. It appeared that the flow of air into the blowline created a slight vacuum under the stripper which caused the oil to be sucked downward and literally sprayed on the cuttings.

These sample identification problems will be less troublesome with additional experience in studying air-drilled cuttings.

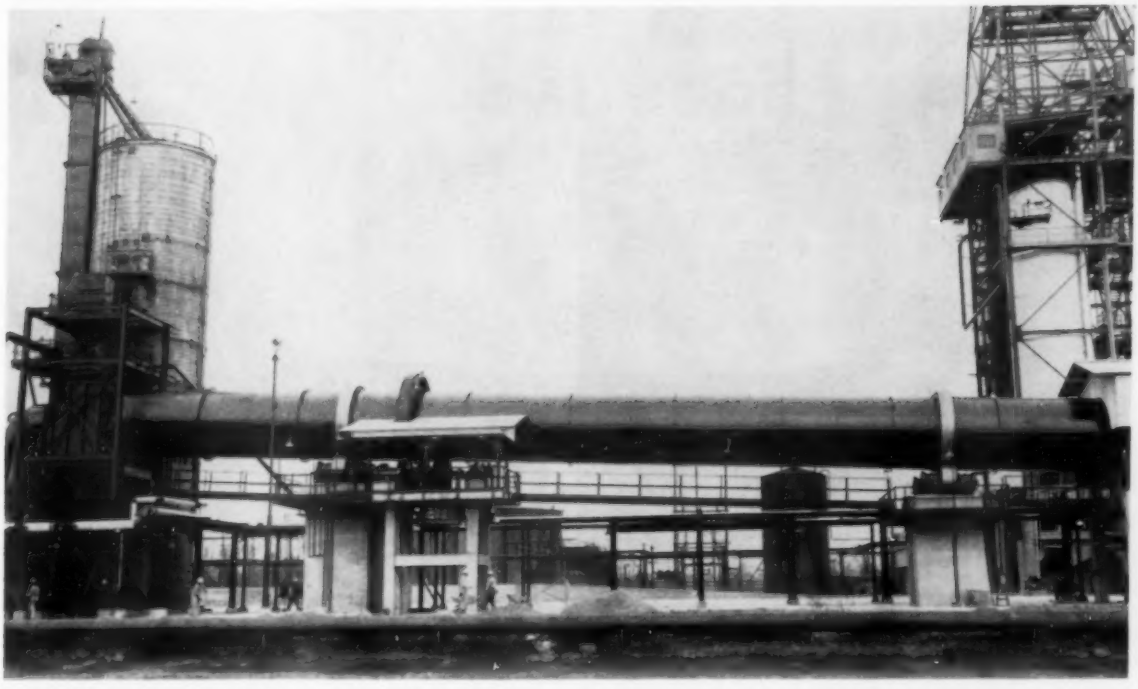
Drilling of the well has proved that air drilling can, under favorable conditions, be carried on successfully and economically through long intervals of open hole.

As more wells are drilled with this medium of circulation the penetration rates will be greatly increased with an accompanying reduction in cost.

**Acknowledgment**

The authors express appreciation to the management of Continental Oil Co. for permission to publish this article. Thanks are due to the other operators who furnished the information for the comparisons presented.

This article originally appeared in The Mines Magazine, official publication of the Colorado School of Mines Alumni Association.



**CALCINING KILN AND FEED SILO** are seen at left in this view of Conoco's coking unit at Lake Charles, La. Kiln drive is in center, and delayed-coker structure and kiln-firing-control building at right.

# Petroleum coke becomes finished product

BY LAWRENCE E. ADEE

CONOCO'S Lake Charles coking unit, designed to eliminate residual fuel-oil production, will produce approximately 85,000 tons of calcined coke annually for industrial use and 4,200 bbl. of refinery stock daily for manufacturing motor gasoline.

As normally produced, petroleum coke contains a considerable amount of volatile matter which must be removed before the coke can be put to its final use. This is done by calcining at temperatures above 2,400° F. With the volatile content of the coke removed, coke quality depends largely upon density and impurity content. These properties are controlled mainly by the quality of the residuum fed to the coking unit.

**Blocked-out operation . . .** The new delayed-coking unit will produce both electrode-grade and conventional-grade petroleum coke on a blocked-out operation. The coke drums will be cleaned with high-pressure water. Up to this point, the process is strictly conventional delayed coking.

When Continental Oil Co.'s Lake Charles, La., refinery started producing petroleum coke as a quality-controlled, finished product in December, it marked one of the first times a petroleum refiner has calcined his coke to meet customer specifications. Previously, refiners have viewed coke as a low grade byproduct to be disposed of in the most simple manner possible.

Lawrence E. Adee is senior technologist for Continental Oil Co.'s southern and southwestern region manufacturing departments. He joined Conoco in 1938 as a technologist in the thermal cracking division of the Ponca City, Okla., refinery, where he was closely associated with the delayed-coking process. In 1953 he moved to the Billings, Mont., refinery as refinery technologist.

Just below the coke drums, a steep concrete chute delivers the coke to a dewatering area where most of the water drains off to return to the hydraulic decoking equipment. From this point, a dragline moves the coke onto a drainage apron where all the free water is allowed to drain back to the dewatering zone. The drainage apron is divided by a concrete wall which keeps the two grades of coke separated.

After draining, the coke is moved to a belt conveyor which delivers the coke to the calcining feed silo. The dragline tower is equipped with a hinged apron that is lowered onto the curb of the drainage apron. The crane

**CALCINER FEED SILO** showing inclined conveyor bring coke from dragline tower and kiln-feed-control equipment. Waste-heat boiler is behind inclined conveyor.

**CALCINED-COKE STORAGE SILOS** are at left, with kiln-firing-control building at right. Calcined coke cooler is below the firing building as part of vibrating conveyor.

drags the coke up this apron where it falls into a hopper and drops onto a traveling belt. This hopper is equipped with a crushing device which limits lump size to 8 in.

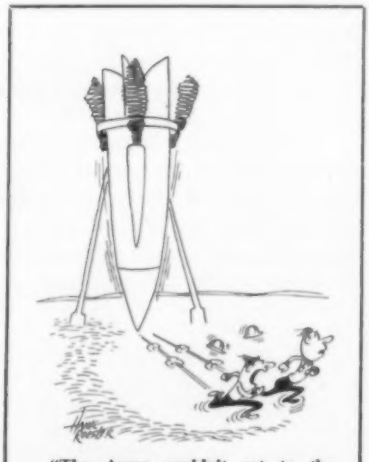
At the end of the conveyor, the coke falls onto a grizzly screen which diverts all pieces larger than 1½ in. Below the crusher, a bucket elevator lifts all the coke to the top of the feed silo. Up to this point the coke handling is intermittent, being regulated by the cycle of coke-drum clean-outs.

**Coke kiln . . .** From the bottom of the feed silo, a second elevator delivers the coke to the kiln hopper. The rate at which the coke leaves this feed hopper is controlled by the vibrating frequency of a shaker table. The shaker table discharges onto a continuous scale, which holds the weight rate of feed to the calcining kiln constant.

It takes about 2 hours for the coke to pass through the kiln, where it is heated to calcining temperature. The temperature of the kiln is controlled by an automatic optical pyrometer which regulates the air flow into the kiln. Fuel gas is fed to the burner in ratio to the air rate. The heat requirement of the kiln is supplied by gas combustion with a minimum combustion of the coke or its volatile matter. The volatile matter removed from the coke is burned in a waste-heat boiler by adding additional combustion air to the gases leaving the kiln.

Upon leaving the calciner, the coke must be cooled with water sprays without leaving any moisture in the coke. This is done by spraying water on the coke as it travels up an inclined vibrating conveyor. The problem, of course, is to get enough water on the larger particles to cool them without mudding the fine particles.

The vibrating conveyor aids greatly in this step, as it lifts the larger particles to the surface as the material travels along the conveyor. The amount of water used in the last bank of sprays is automatically regulated to give a final coke temperature of about 300° F. This assures that all water has been evaporated.



**"The Army couldn't get to the moon with it; maybe it'll reach those oil-bearing sands!"**

**Storage . . .** At the end of the cooler, covered elevators lift the calcined coke to any one of four silos, where it is held until loading time. After calcining, every precaution is taken to keep the coke dry. From the product storage silos, the coke is carried to the loading chutes on a covered conveyor. The coke is shipped in covered hopper cars.

There are many characteristics of calcined petroleum coke which are related to the operating conditions of the coking unit. In the past, with coke production and coke calcining being conducted by separate industries, it has been impossible to closely correlate these variables. It is felt that by operating the two processes in close conjunction much better correlations can be developed; coke of a much more consistent quality can be produced.

At any rate, the increased value of calcined petroleum coke justifies lifting it from the classification of a low-grade byproduct, sold on an "as-produced" basis, to the classification of a finished product that meets controlled specifications.

PRODUCTION

## New light on

# Two ways to better oil recovery

## 1. Gas-driven solvent bank process
## 2. Enriched-gas injection

By DR. CHARLES D. RUSSELL
Carter Oil Co., Tulsa

SOLVENT EXTRACTION and miscible-fluid displacement show promise for increasing the recoverable oil reserves of the United States. We have done much basic laboratory and theoretical work on solvent extraction processes.

Two solvent processes, the gas-driven solvent bank and enriched-gas injection, both of which use only a small quantity of LPG, have been field tested. And both of these techniques are potentially capable of recovering much more than 1 bbl. of oil per barrel of LPG. The solvent is recoverable for sale or reuse.

Considerable field testing is needed to determine the circumstances where solvent processes work to best advantage.

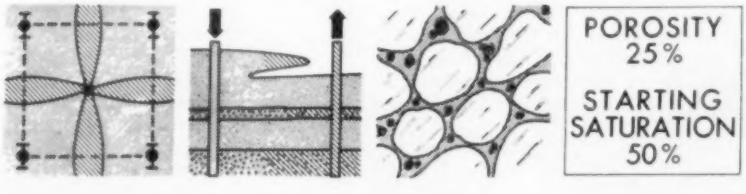
**Recovery efficiency . . .** When conventional oil-recovery methods are applied, oil is always left in the ground. In some fields the recovery factor is higher than in others; but, in general, it may be stated that for every barrel of oil brought to the surface, an average of up to 2 bbl. of oil are left behind. There are two broad reasons for this obvious inefficiency:

1. Due to the heterogeneities in the reservoir and the channeling of the fluids, some of the oil is bypassed.

2. Even in the regions of the reservoir sand from which oil drainage takes place, unrecoverable oil is retained by capillary forces.

This defines the problem, and therein lies the region for research and investigation. From a scientific standpoint it is possible to work on ways of improving volumetric coverage in the reservoir and also on methods that reduce the effects of capillarity, or completely eliminate it. This can best be illustrated by Fig. 1.

If the reservoir has 25 per cent porosity and a starting oil saturation of 50 per cent of the pore volume after normal primary depletion, the reserves in this condition are 970 bbl. of oil per acre-foot. The ultimate goal would obviously be to recover all of this oil. Such a situation would prevail if the area swept, the section swept, and the saturation reduction were 100 per cent.



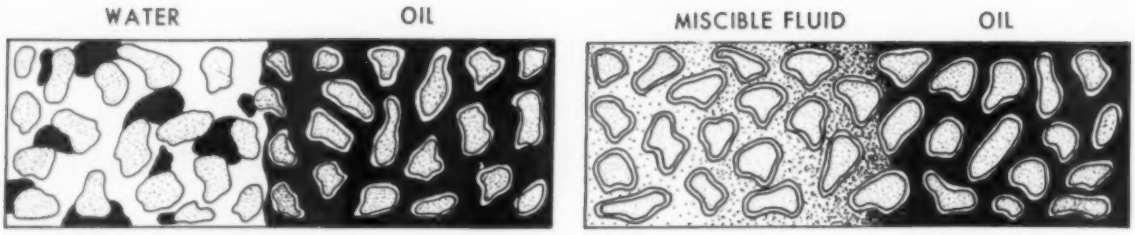

| AREA SWEPT | SECTION SWEPT | SATURATION REDUCTION | BBLS. PER ACRE - FT. |
|---|---|---|---|
| 100% | 100% | 100% | 970 |
| 85% | 75% | 50% | 310 |
| 75% | 65% | 90% | 425 |
| 90% | 85% | 95% | 710 |

**HIGH SATURATION REDUCTION** combined with high aerial and section sweep is a requisite for an efficient oil recovery process. Fig. 1.

For some water floods, the saturation within the pores might be reduced by 50 per cent. With 85 per cent sweep efficiency and 75 per cent section efficiency, the oil recovery would be 310 bbl. of oil per acre-foot. Even if a higher saturation reduction in the pores could be expected, i.e. possibly 90 per cent, poor sweep and section efficiencies could prevent the process from yielding more than one-half of the oil. It is necessary, therefore, to look for a process, or a combination of processes, that gives a high saturation reduction and at the same time high areal and section sweep. Various new methods have been tried. This discussion deals principally with the single subject of solvent extraction as a means for promoting higher recovery of oil in gas-drive operations.

**Extraction good . . .** A good way to get oil out of a permeable material is to wash it out, or extract it, with a solvent that mixes with the oil. In the laboratory it is an established fact that if enough propane, or LPG, is flushed through a piece of reservoir rock containing oil that all of the oil can be extracted. In fact, this method was suggested as an oil production technique in the 30's by Uren in his book, Petroleum Production Engineering—Exploitation.[3] Further reference to literature of recent years shows that considerable technical effort has been expended on this approach.[4-30]

LPG is fairly abundant and is easily recoverable from crude oil. It would, in general, appear to be a very desirable solvent for recovering crude. However, it is uneconomical to trade a barrel of LPG for a like volume of crude oil and this fact leads to at least two approaches, both of which use only a small quantity of LPG. These may be called the **gas-driven solvent bank process** and **enriched gas injection.** Both of the techniques are potentially capable of recovering much more than 1 bbl. of oil per barrel of




**IMMISCIBLE FLUID DISPLACEMENT** results in isolated pockets of oil as shown at left. In miscible fluid displacement, right, no such pockets remain. Fig. 2.

LPG. Moreover, the solvent should be recoverable for sale or reuse.

There are a number of other processes that have been covered in the literature, all of which rely on the solvent extraction principle, i.e. the displacement of oil is accomplished by a bank of intermediate hydrocarbons that is driven in turn by gas.[27] They differ somewhat in nomenclature and also in the manner in which the intermediate hydrocarbons are formed into a bank. Some of the techniques rely on complete miscibility of the flowing fluids in the reservoir.

Others depend only on partial miscibility and in reality should be classified as immiscible displacement processes. In this latter case, the improved oil recovery can be accounted for by the vaporization and condensation effects which occur in the reservoir; the improvement results from the swelling of and the viscosity reduction of the crude oil which is displaced.

**Extraction mechanism . . .** In order to understand the mechanism of solvent extraction, it might be fruitful to compare this process with water flooding. Each of these diagrams in Fig. 2 can be thought of as a micro-cross-section of reservoir rock. Flow is from left to right, with an input well far off to the left and a production well to the right. For the case of water flooding, as shown in the left diagram, water comes along and pushes the oil out of the way in a reasonably pistonlike manner. Isolated pockets of oil are left behind the front. This is a example of **immiscible fluid displacement,** in which capillary forces cause retention of the oil in the pores of the rock.

With solvent extraction, as shown in the bottom diagram, a **miscible fluid displacement** takes place. The displacement proceeds as in the case of a water flood except that there is no sharp discontinuity between the two fluids. There is no interface similar to that found in an immiscible fluid displacement. Instead, there is a transition zone, or a region where the solvent and the oil mix.

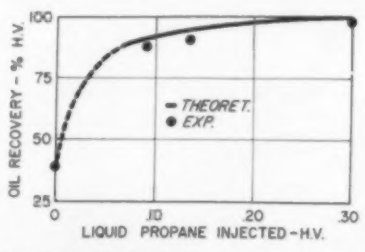
Aronofsky treats this diffusional problem very nicely with his phenomenological theory of the mixing and diffusion process for the flow in a porous medium of two miscible liquids of equal density and viscosity.[24] The miscible displacement process is rate sensitive. The flow rate must be slow enough to allow the solvent to mix with the oil so that the oil can be extracted efficiently. Also, when banks or slugs of solvents are used, the rate must be fast enough so that the bank will not spread out too far by diffusion and thus be destroyed. Generally speaking, practical oil-field rates are bracketed within this range.

### Solvent Bank Process

While it is uneconomical to trade a barrel of propane, or LPG, for a barrel of oil, it is possible to remove part of this economic disadvantage by recovering most of the solvent and using it over. However, generally speaking, this would require an abnormally large supply of LPG, tie it up for a long period of time in the reservoir, and require large expenditures for processing equipment. The best way to improve the economics seems to be to use the minimum amount possible of LPG in the process.

One way that this can be done is by injecting a small bank of LPG at the input wells and driving it by gas through the reservoir to the producing wells.

This process was successful in laboratory-scale models. Excellent oil recoveries were obtained depending upon the size of the LPG bank used. This is illustrated in Fig. 3. In this plot, the oil recovery is expressed in per cent of a hydrocarbon volume; the bank (or slug) size, as the fraction of a hydrocarbon volume. For a linear, homogeneous laboratory model, the oil recovery approaches 100 per cent h.v. when the bank of propane approaches 0.30 h.v. With a bank size of 0.15 h.v., the oil recovery is in excess of 90 per cent h.v. or about twice that obtained in the same model by water flooding.



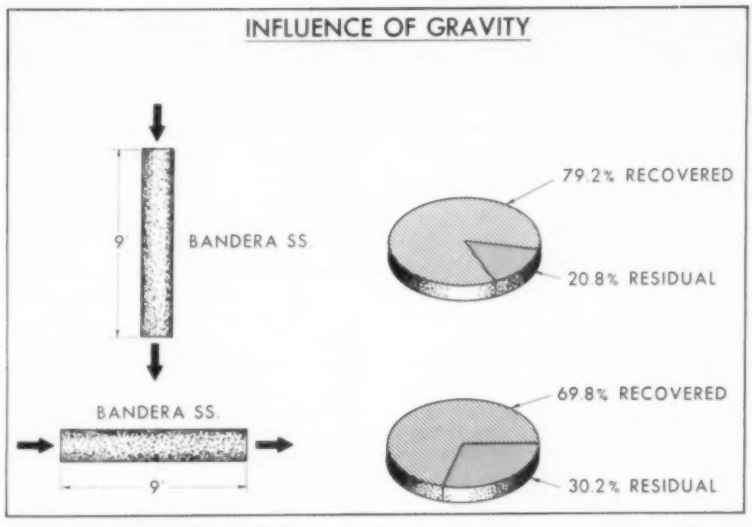

**HIGH OIL RECOVERY** has been obtained using an LPG bank on laboratory scale models. Fig. 3.

The theoretical picture for this process is reasonably well defined at the present time and has been treated rather completely by Johnson and Welge.[16] It is not necessary for this discussion to go into this theory in detail but it is sufficient to point out that excellent agreement has been obtained with the experimental results. This is shown also in Fig. 3 when the curve is compared with the experimental points.

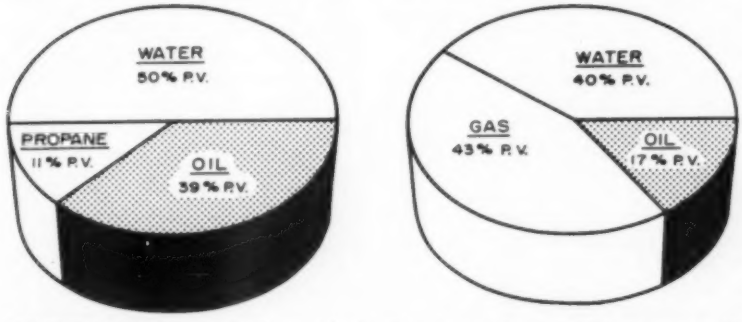
The utility of this theoretical approach is, of course, obvious. Calculative predictions for linear systems can be made in a reasonable length of time, either with medium-speed computing machinery or even with hand calculators. It is also possible, for example, to arrive at oil-recovery efficiency without resorting to long and costly experiments. The effect of changing such variables as pressure, temperature, and solvent composition can also be readily explored.

**Vertical injection . . .** Petroleum technologists also have a reasonably complete mechanistic knowledge of miscible fluid displacement in general. The paper by Lacey, Draper, and Binder presents a complete discussion of this subject.[15] One of the most important observations made was that a distinct difference was found between vertical and horizontal solvent floods. Because of the influence of gravity, flooding in the vertical direction (solvent injected at the top) is more efficient than in a horizontal injection. This effect is illustrated in Fig. 4, which shows the vertical flood recovering 10 per cent more oil.

This situation could be far more striking in the field where it is expected that poor volumetric coverage (or low comformance) would have a very adverse effect on the horizontal




**VERTICAL FLOOD RECOVERS** 10 per cent more oil in solvent operations. Fig. 4.




**SOLVENT FLOODS** can cut the residual oil in watered-out models by one-half. Fig. 5.

flood and perhaps very little effect on the vertical. This points up the beauty of crestal injection for solvent processes. It may very well turn out to be a fact of life that for efficient operation of solvent processes and methods that involve adverse mobility ratios, the production people must seek fields with significant dip to apply this technique. Other approaches pointed at obtaining higher conformance in horizontal pools are being tried, as for example, the proposed idea of simultaneous water and gas injection.[21]

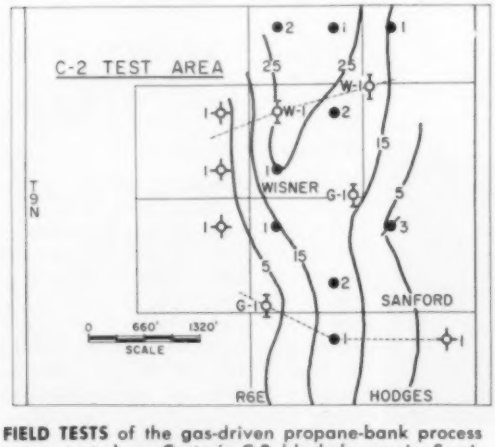
Another important point is that many reservoirs are watered out before they become possible candidates for solvent extraction. Talasch and Crawford state that in laboratory models substantially all of the oil remaining after water flooding can be recovered by subsequent flooding with petroleum solvent.[20] By fractionation and recirculation of the produced effluent, it may be possible to reduce the solvent requirements by a factor of two or three. However, this may not be enough to make the process financially attractive.

At the Carter laboratory, researchers have applied the gas-driven solvent bank process to watered-out models. Some of their results are shown in Fig. 5. In the case shown, it can be observed that of the 39 per cent pore volume oil remaining after a water flood, approximately one-half of it was removed as a result of the solvent extraction process.

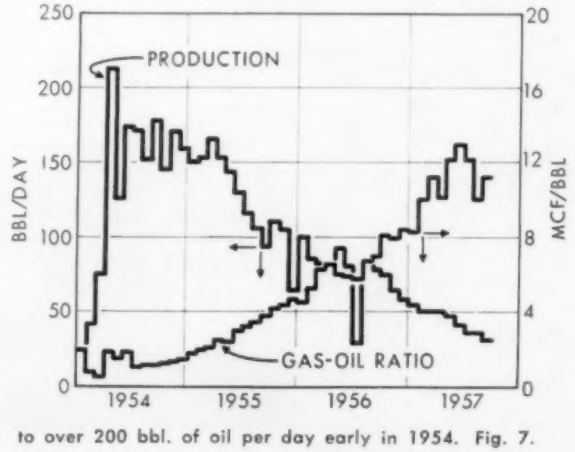
Although it is generally not practical, it would be better not to water flood prior to using solvent extraction to recover oil from a reservoir. On the other hand, there are many likely candidates for solvent flooding among pools already watered out, and it might still prove attractive financially to apply the gas-driven solvent bank process to certain of these pools.

**C-2 Block field test . . .** As a result of encouraging laboratory results, plans were started in 1952 to test the gas-driven propane bank process at Carter's C-2 Block leases in Seminole County, Oklahoma. A report of this operation has been given in complete detail by Jenks, Campbell and Binder.[13,14] The discussion here is to bring this picture up to date.

The test is being run in the Booch sand which is a bar-shaped producing horizon occurring at a depth of 3,500 ft. The total reservoir thickness varies

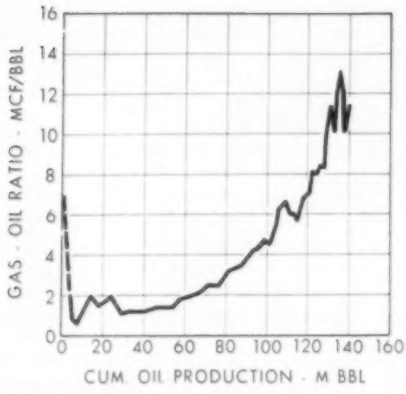



**FIELD TESTS** of the gas-driven propane-bank process were started on Carter's C-2 block leases in Seminole County, Oklahoma, in 1952. Fig. 6.

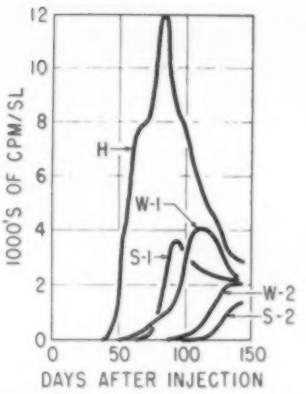



to over 200 bbl. of oil per day early in 1954. Fig. 7.

**PRODUCTION RATE** increased from 13 bbl. of oil per day




**GAS-OIL RATIO** has increased with cumulative oil production. Fig. 8.




**RADIOACTIVE TRACERS** enable the tracing of the solvent bank. Fig. 9.

from 12 to 32 ft. The porosity averages 18 per cent; the air permeability varies from 1 to 100 md., with the average being 30 md. The connate water averages 35 per cent. The natural depletion mechanism which operated in the reservoir is thought to be solution gas drive. No significant water was produced during primary depletion.

Fig. 6 is a map of the C-2 test area. The four primary producing wells are the 1 Wisner, the 1 and 2 Sanford and the 1 Hodges. Several additional wells were drilled: the G-1 Wisner and G-1 Sanford for propane and gas injection; the 2, Wisner a new production well; the W-1 Wisner and the W-1 Sanford as water-injection wells so that a water barrier could be established across the northern end of test area. This water barrier was considered to be very necessary in order to minimize the loss of hydrocarbons from the test area, which is defined as that portion of the reservoir falling between the dashed lines on the map.

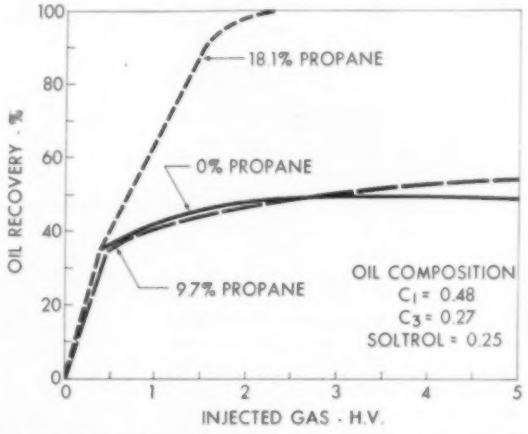
The quantity of oil present in this region at the start of the test was estimated to be 1.2 million barrels. Although not related directly to the test, other wells have been drilled in the area and some of these are indicated also in Fig. 6. There are effectively eight additional producing wells outside of the test area that are being observed regularly for possible test influence.

**Propane injection...** After workover operations and preliminary data gathering were completed, the reservoir was repressured to 250 psia. by injecting approximately 54 M.M.c.f. of gas. This was necessary to keep the propane in a liquid state at the reservoir temperature of 120° F. Six million gallons of propane were then injected, two-thirds at the G-1 Wisner and the rest at the G-1 Sanford. This injection of the propane bank was completed in October 1953.

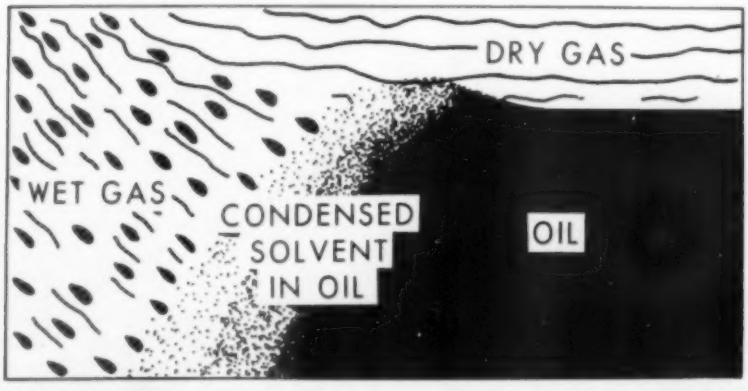
In early March 1954, gas drive was started to propel the propane banks through the reservoir toward the production wells. To October 1957, a total of 569 M.M.c.f. of gas had been injected, 99 M.M.c.f. at the G-1 Sanford and 470 M.M.c.f. at the G-1 Wisner. These figures do not take into account the gas used for the original repressuring operation.

The daily production rate and the gas-oil ratio plotted versus time are shown in Fig. 7. The daily production rate increased from about 13 bbl. of oil per day to over 200 bbl. of oil per day early in 1954 and has been decreasing steadily during the 4-year test period to a present value of 34 bbl. of oil per day. State allowable proration restricted production for about a year following the initial response.

The total oil production to October 1957 was 140,000 bbl. This parallels a gas production of 535 M.M.c.f. and a propane production of 71,400 bbl., or 50 per cent of the injected volume. The general shape of the gas-oil-ratio curve as a function of cumulative oil production is shown in Fig. 8.




**LABORATORY RESULTS** show that enriched gas containing 18 per cent propane is very effective in oil recovery. Fig. 11.




**SOLVENT PROCESS** works as the gas' LPG condenses and dissolves in the crude oil. An oil bank rich in LPG is built ahead of the gas front. Fig. 10.

**Test interpretation . . .** This is a complicated proposition and it is difficult to do this rigorously during the course of the test. At the moment, several things are being done to help with this interpretation. For example, plans are under way to drill several core holes within the test area in an attempt to evaluate residual oil after flooding and to obtain data on section and areal sweep, which is effectively a measure of conformance.

In the tracing program, four curies

of krypton-85 were injected into the G-1 Wisner and two curies of tritiated methane into the G-1 Sanford. Periodic samples are taken at the producing wells and an accurate low-level radioactive count is made on these samples. Fig. 9 illustrates the type of data obtained at several of the wells. The number of counts per minute per liter of produced gas is plotted as a function of time.

There are several things that can be mentioned from the standpoint of test interpretation. At least 2 bbl. of oil have been produced for every barrel of propane used effectively in the process. Present indications are that severe channeling did not take place. Finally, it has been shown that substantial quantities of oil can be produced by the gas-driven solvent bank process at modest propane-oil and gas-oil ratios.

### Enriched Gas Injection

This is sometimes termed wet-gas injection or condensing-gas drive. In this technique substantial quantities of LPG are added directly to the gas stream and this enriched gas is injected as a driving fluid. Industry effort in this field is high and several companies are active.

Fig. 10 illustrates in a very schematic way how the process works. This represents in a rough manner a reservoir cross-section with saturations plotted versus distance. Flow is from left to right. The LPG in the gas stream condenses and dissolves in the crude oil. This reduces the viscosity and swells the oil in this region. Thus, an oil bank rich in LPG is built up ahead of the gas front very similar to the solvent bank injected in the gas-driven solvent bank process. Such a displacement can be entirely within the miscible region, or only partially, depending upon the physical and chemical characteristics of the hydrocarbons present in the reservoir.

Hall, Merliss, and Ewing have covered the subject of gaseous injection of hydrocarbons very completely.[27] High-pressure gas-drive, solvent bank flooding, and enriched gas injection are all related. The pressure-volume-temperature (PVT) behavior of the hydrocarbon components present during the gas-drive operation determines whether the process is a miscible or an immiscible fluid displacement. It can generally be considered to be the most efficient way of conducting the gas-drive when conditions of complete miscibility prevail. However, considerable benefit can be derived in immiscible causes because of swelling and lowered viscosity of the oil as well as the vaporization effects.

Some laboratory results on enriched gas injection are shown in Fig. 11, and this has to do specifically with the effect of the amount of solvent contained in the driving gas on the oil recovery versus throughput curve. In this particular case a "live oil" is used. Methane and propane are dissolved in the soltrol in the proportions shown. Three gas-drive runs were made: (1) dry gas, (2) equilibrium gas containing only 9.7 per cent propane, and (3) rich gas containing 18 per cent propane.

As shown by the two lower curves, which nearly coincide, driving the system with equilibrium gas containing the 9.7 per cent propane gives very little improvement over dry gas for this particular system. In the case of the 18 per cent propane gas, the recovery of oil approaches 100 per cent at less than three hydrocarbon volumes throughput. This set of results is important in clarifying one point for engineering applications.

Unless there are enough condensable hydrocarbons to give a mixture in excess of the equilibrium gas mixture, it is of no advantage in the producing operation to add the material to the gas injection stream.

All of these results are given for linear, homogeneous sandstone and it should be remembered that considerable correction for reservoir conformance must be applied when these curves are used for field predictions. The three-dimensional reservoir problem has not been solved directly but it can be broken down into three more easily solved components: the areal system, the cross-section, and the linear system. By making judicious assumptions it is possible to tie the three components of the problem into a final three-dimensional solution.[27]

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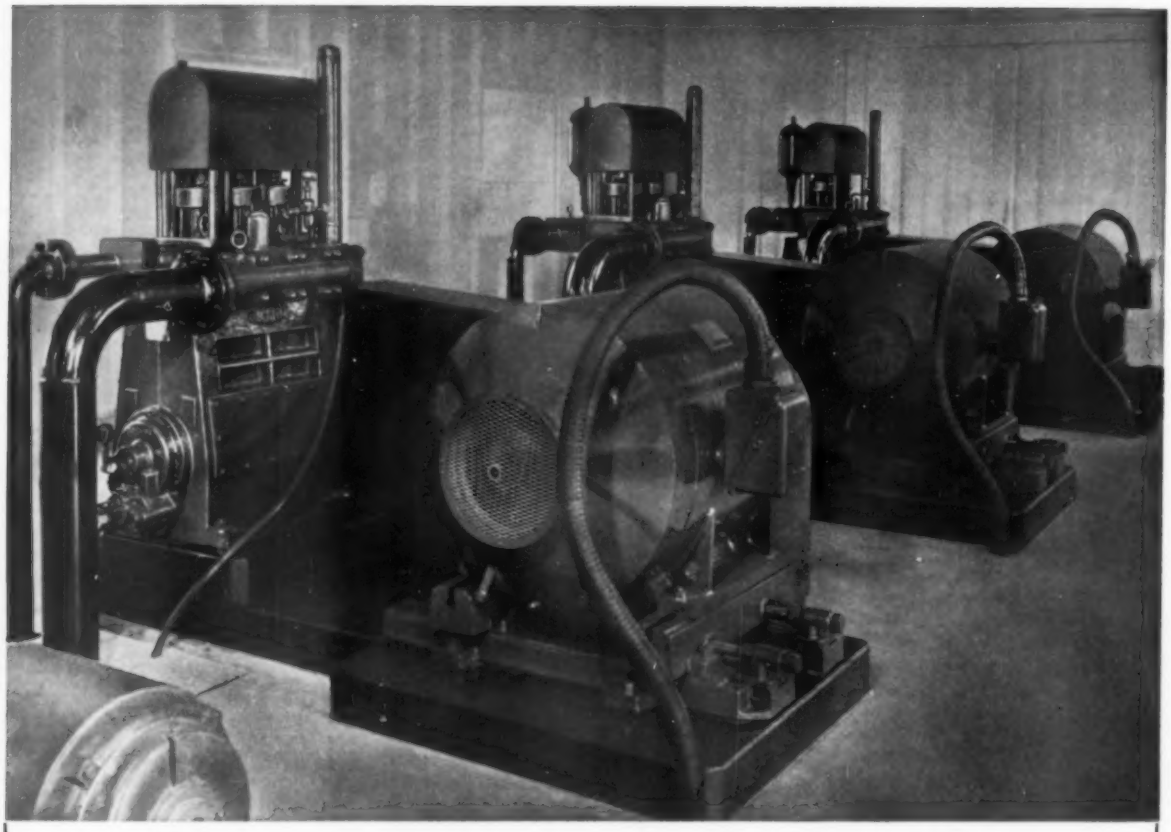


## FIELD REPORT

FLOOD: Loudon-System No. 2

PUMPS: 24 Aldrich Direct Flow Triplex

PUMPS INSTALLED: April 1953

EXPERIENCE TO DATE:

Carter Oil Company reports..."Pumps are in continuous operation. Very satisfactory service — very low operating cost...equal to, or less than, any other type pump used similarly. Excellent service from area representatives."

Field parts stock available in Carmi, Ill., Charleston, W. Va., Houston, Los Angeles, Odessa and Tulsa. For further information, write the Aldrich Pump Company, 9 Gordon Street, Allentown, Pa.

***the toughest pumping problems go to*** ALDRICH

# A, B, C's of reciprocating compressors

THE RECIPROCATING compressor was the first compressor to be developed, being very similar to the liquid pump in construction. Today, it is by far the most common type used in the refinery. It is primarily a simple cylinder with plunger or piston with intake and discharge valves. The operation is illustrated in Figs. 1 and 2.

As the piston moves to the left (Fig. 1), the chamber increases in volume and the pressure drops. When the pressure drops, the discharge valve closes, having more pressure above it than below. The piston moves farther, and the pressure decreases more until it is less than the pressure below the intake valve.

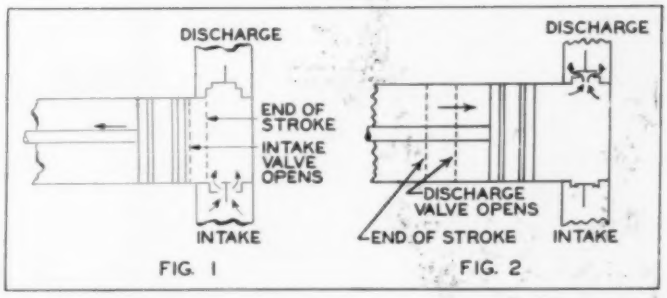
This greater pressure on the lower side raises the valve, and gas rushes to the cylinder, equalizing the pressures there with the intake pressure. Thus, the compression chamber is at or near the intake pressure and the volume is that of all the cylinders to the right of the piston (piston at end of leftward stroke).

The piston now starts its stroke or movement to the right. (See Fig. 2). The volume of the compression chamber decreases, causing the pressure to increase. The increased pressure, now being higher than the intake pressure, closes the intake valve.

As the piston moves farther to the right, the pressure grows until it is equal and then greater than the discharge pressure. When this happens, the discharge valve opens, having more pressure below than above, and the compressed gas from the cylinder goes into the discharge line.

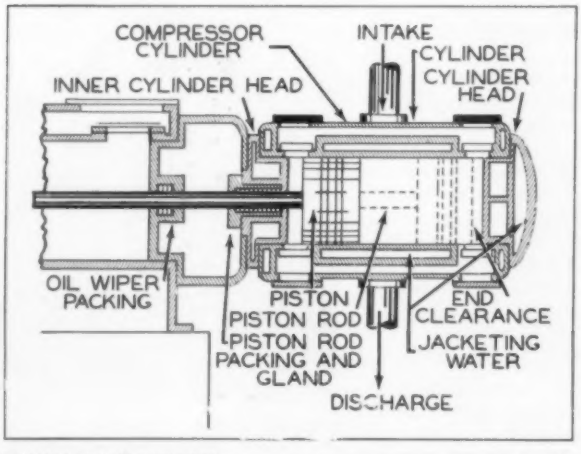
It is easy to distinguish the difference in the operation of the reciprocating compressor and in the operation of a liquid pump. Basically, the operation is the same. The difference is the lag in the opening and closing of the valves. The lag, of course, is due to the fact that gas is compressible.

The same quantity of gas will occupy the changing size of the container (the cylinder), whereas a quantity of liquid does not change in volume as the volume of its container is changed. Since liquid is incompressible, when the piston changes direction in the cylinder of a liquid pump, the changing pressures close one valve and open the other.




**SIMPLE CYLINDER** operation in reciprocating compressor works much like a liquid pump with an intake of gas (Fig. 1), followed by discharge by means of a piston thrust (Fig. 2).

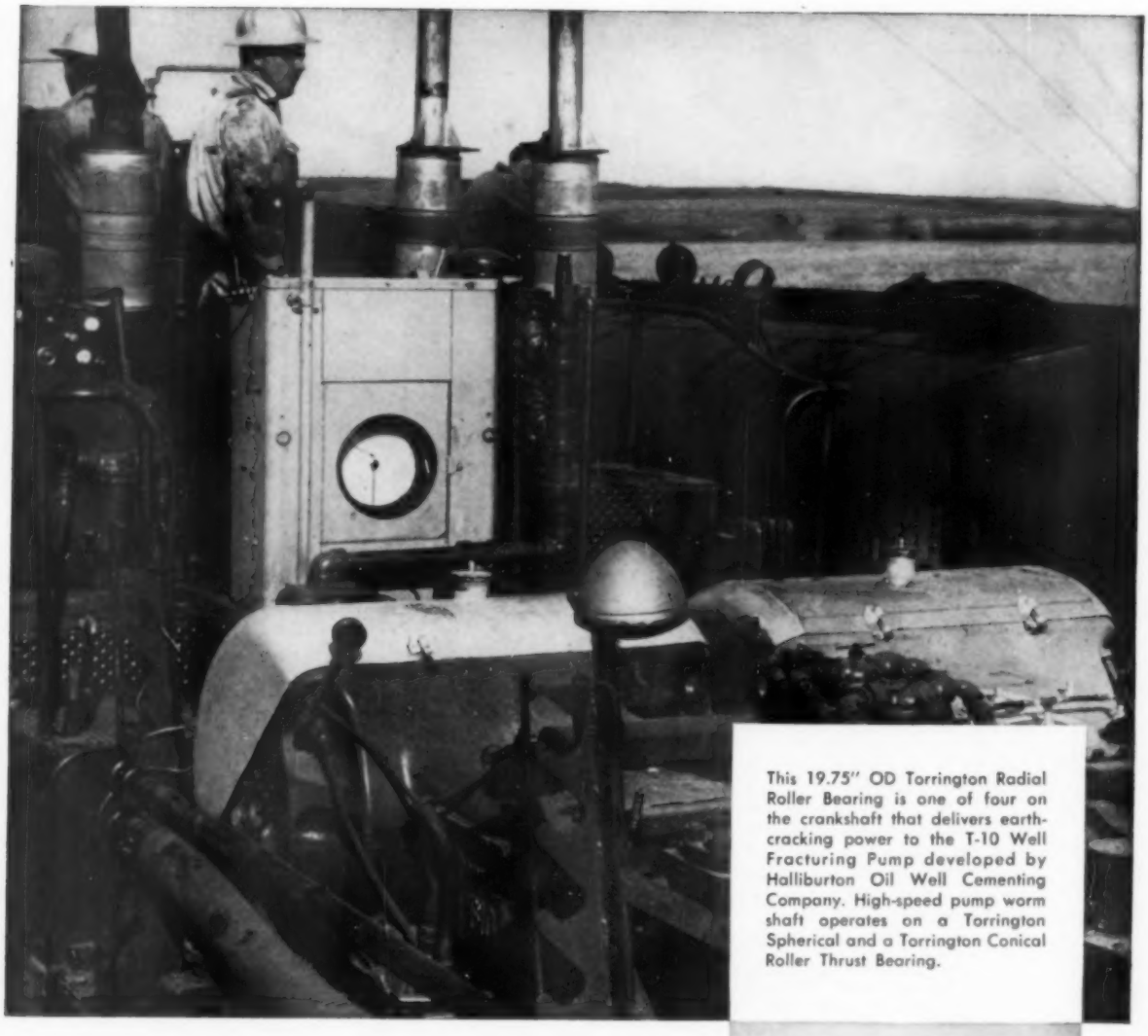
This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co.




**CYLINDER AND PISTON** arrangement can compress twice the volume with inner-cylinder arrangement (Fig. 3).

**Parts and terms . . .** Piston and cylinder are common terms that need no explanation. Fig. 3 gives the names of additional parts and is self-explanatory. Details of compressors vary, and correct names of the small parts are obtained from the manufacturer's parts list. The valves illustrated are poppet type and are used to make a more understandable picture of the operation.

**Single or double acting . . .** The cylinder and piston arrangement illustrated in Figs. 1 and 2 can be made to compress approximately twice the volume by installing an inner cylinder head and intake and discharge valves on the left end of the cylinder the same as on the right. Fig. 3 shows this arrangement.



This 19.75" OD Torrington Radial Roller Bearing is one of four on the crankshaft that delivers earth-cracking power to the T-10 Well Fracturing Pump developed by Halliburton Oil Well Cementing Company. High-speed pump worm shaft operates on a Torrington Spherical and a Torrington Conical Roller Thrust Bearing.

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# Take care of ethanolamine solutions by following sensible rules in gas-treating systems

By J. C. DINGMAN and R. P. MONAGHAN

DURING THE PAST DECADE there has been increasing recognition on the part of the gas-treating industry of the need for proper care and maintenance of ethanolamine solutions to prevent operating and corrosion problems. In this Field Processing series we will review the problems involved and means available for maintaining ethanolamine solutions in good condition.

In systems operating under severe conditions, the need for maintenance becomes most apparent; amine solutions operating under mild conditions may not exhibit the need so quickly. Maintenance neglect even under mild conditions, however, tends to be cumulative and will reach proportions undesirable for proper operation and maintenance of the equipment.

### Solution Deterioration and Fouling

There has been a substantial research effort in the last decade by designers, users and amine manufacturers, to resolve the problems of design and operation of ethanolamine gas-treating units.

The major problems may be classified as follows:

Solution deterioration due to (1) oxidation of amine, (2) thiosulfate formation, (3) organic acid formation, (4) foaming, (5) thermal decomposition of amine, (6) chemical reaction of amine.

Solution fouling due to: (1) iron compounds, (2) sludge accumulation.

**Oxidation . . .** The major cause for presence of oxygen in natural gas is leakage in gathering systems operating under vacuum. Flue gases being treated for their $CO_2$ content will contain oxygen. Other more common sources of oxygen to the amine solution include unblanketed storage and surge vessels, collection and return lines for amine pump drippings, leaks in vacuum-operated regenerators or reclaimers, and air leaks through packing glands of solution pumps. Some refinery streams also contain oxygen as a result of catalytic cracking.

Investigation of the effect of oxygen by early authors[1] showed that upon stripping of the carbon dioxide from the ethanolamine solutions, iron compounds are precipitated. The mechanism is considered to involve oxidation of the amine and is believed to be as follows:

Ethanolamine in the presence of carbon dioxide and oxygen is oxidized to organic acids such as glycine, glycolic and oxalic acid.[2 3] These organic acids attack the steel surfaces of towers and exchangers to form iron salts, most of which undergo an interchange reaction with the $CO_2$ to form iron carbonate which precipitates from the solutions. The organic acid is free to combine with additional iron.

Other mechanisms which explain the causes of corrosion have been described[4 5] and there is not complete agreement that the above is a major cause of corrosion. However, it can be said fair definitely that it is one cause and that oxygen is, therefore, deleterious to the amine solution.

**Thiosulfates . . .** As mentioned, there are a number of means by which oxygen can be introduced to the sweetening system. Where aqueous amine solutions are in contact with hydrogen sulfide and oxygen, amine thiosulfates are formed. These are not regenerable in the normal manner[6 7 8] and consequently will concentrate in the solution.

In addition to inactivating some of the ethanolamine, the thiosulfates increase the viscosity and contribute to the corrosiveness of the solutions. Regeneration of monoethalonamine from such a solution is accomplished by distillation.

**Organic acids . . .** Organic acids other than those referred to above and in addition to those which will be discussed under foaming, are sometimes introduced into systems where they combine with the amine to form salts which are not regenerated in the stripper. Two such organic acids commonly encountered are formic acid and acetic acid. Their presence is particularly troublesome because they are capable of neutralizing the entire solution in a comparatively short time.

Reclaiming of monoethanolamine from these salts is possible by distilling the material in the presence of soda ash. Advantage is taken of this feature in the operation of monoethanolamine-solution reclaimers, discussed later in this series. The much-preferred course is to avoid contamination of the solution by these acids through the use of a water or caustic scrubber located on the gas line upstream of the amine-gas contactor.

Authors are with Jefferson Chemical Co., Houston. From paper presented at California Natural Gasoline Association meeting.

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By W. L. NELSON, Technical Editor

Questions on TECHNOLOGY

# Tower capacity ranges by 400 per cent

**In the "Bottleneck Removal" article of the October 7, 1957, issue it is stated that a reduction of overhead product increases the capacity of a fractionating tower. Is that statement entirely correct and can you outline the situation for me?—J.T.**

The capacity of multidraw fractionating towers can range by several hundred per cent for the same percentage of crude oil residue, depending on the amounts of overhead liquid products withdrawn, the pressure, the tray spacing, amount of steam stripping, etc.

In general, the larger the amount removed as an overhead vapor, the greater the capacity of the tower. The situation with respect to a topping operation was explored in the July 2, 1956, issue of the Questions on Technology page, complete with a figure showing nine arrangements of fractionating towers.

When topping 38.6° API Mid-Continent crude oil to a 32.5 per cent reduced or topped crude oil, the following nine arrangements or methods of processing are considered:

**1. Simple flash.** The gasoline, kerosine, and gas oil are flashed from the crude oil at a pressure of 50 psig. using no fractionating plates (only a wire-mesh blanket for stopping entrainment), using no reflux at the top of the tower or on the wire-mesh blanket, and using no stripping steam (see Table 1).

**2. Refluxed flash.** Same as Method 1 except eight plates are used and the first or second plate from the top is refluxed with gas oil or with part of the crude oil. The capacity is sharply reduced by the introduction of reflux.

**3. Refluxed flash and steam stripping.** This is the same arrangement as Method 2 except that 10 plates are used and 3 or 4 of them are used for steam stripping.

**4. Pressure fractionator.** This is a conventional topping tower with kerosine and gas-oil side products, with reflux at the top and at the gas-oil plate, except that a pressure of 50 psig. was employed. The effect of pressure can be judged by comparison with Method 7.

**5. Partial topping.** In this arrangement gas oil is withdrawn as a liquid but the gasoline and kerosine pass overhead. The tower is refluxed with kerosine at the top and on the side with gas-oil reflux. The maximum diameter (and therefore tower diameter) occurs at the gas-oil plate.

**6. Partial topping.** The same arrangement as Method 5 but all of the refluxing is done at the top. Thus heat to condense the gas oil is delivered up the tower to the top by reflux vapor which causes a further decrease in capacity.

**7. Topping (gas-oil side reflux).** This is a conventional multidraw topping tower except that reflux heat is removed at both the top and at the gas-oil plate (side reflux). The biggest loads occur at the gas-oil plate and at the top, and almost the same diameter is required at both places.

**8. Topping (kerosine side reflux).** This modification fails to increase the capacity of the tower (over the capacity of Method 7) because now the point of largest duty becomes the kerosine plate.

**9. Topping (top reflux only).** This conventional method of removing all of the reflux heat at the top requires the largest tower diameter or operates at the lowest capacity.

Somewhat larger capacities can be attained with any of the systems by the use of wire-mesh mist extractors at the top of the towers and in the extreme, below each side-draw product.

Side reflux can also be used at two points, but more elaborate controls are necessary, and little capacity is gained thereby.

**TABLE 1—CAPACITIES OF TOPPING SYSTEMS WHEN PRODUCING A 32.5 PER CENT RESIDUE FROM MID-CONTINENT CRUDE OIL**

| Method | Capacity, B/D/sq. ft. | Name | No. of plates | Tray spacing (in.) | Pressure at top (psig.) | Reflux—Top | Reflux—Side | Stream | Overhead liquid products† |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 630 | Simple flash | None* | | 50 | None | None | None | None |
| | 511 | Simple flash | 8 | 36 | 50 | None | None | None | None |
| | 410 | Simple flash | 8 | 24 | 50 | None | None | None | None |
| 2 | 261 | Refluxed flash | 8 | 36 | 2 | (G.O. or | ..... | None | None |
| | 210 | Refluxed flash | 8 | 24 | 2 | Crude) | ..... | None | None |
| 3 | 210 | Refluxed and stripped | ‡10 | 36 | 2 | (G.O. or | ..... | Yes | None |
| | 168 | Refluxed and stripped | ‡10 | 24 | 2 | Crude) | ..... | Yes | None |
| 4 | 283 | Pressure fractionator | ‡19 | 36 | 50 | Gaso. | G.O. | Yes | K. & G.O. |
| | 227 | Pressure fractionator | ‡19 | 24 | 50 | Gaso. | G.O. | Yes | K. & G.O. |
| 5 | 206 | Partial topping | ‡12 | 36 | 3 | Kero. | G.O. | Yes | G.O. |
| | 167 | Partial topping | ‡12 | 24 | 3 | Kero. | G.O. | Yes | G.O. |
| 6 | 203 | Partial topping | ‡12 | 36 | 3 | Kero. | None | Yes | G.O. |
| | 164 | Partial topping | ‡12 | 34 | 3 | Kero. | None | Yes | G.O. |
| 7 | 200 | Topping (G.O. reflux) | ‡19 | 36 | 4 | Gaso. | G.O. | Yes | K. & G.O. |
| | 161 | Topping (G.O. reflux) | ‡19 | 24 | 4 | Gaso. | G.O. | Yes | K. & G.O. |
| 8 | 203 | Topping (kerosine reflux)§ | ‡19 | 36 | 4 | Gaso. | Kero. | Yes | K. & G.O. |
| | 164 | Topping (kerosine reflux)§ | ‡19 | 24 | 4 | Gaso. | Kero. | Yes | K. & G.O. |
| 9 | 187 | Topping (top reflux) | ‡19 | 36 | 4 | Gaso. | None | Yes | K. & G.O. |
| | 149 | Topping (top reflux) | ‡19 | 24 | 4 | Gaso. | None | Yes | K. & G.O. |

*Number of plates. Just an unrefluxed wire-mesh blanket. †* total of 67.5 per cent overhead. What is not liquid goes out of the tower at the top. ‡Three or four of these plates are used for steam stripping of the crude-oil residue. §Maximum area requirement is at kerosine plate.

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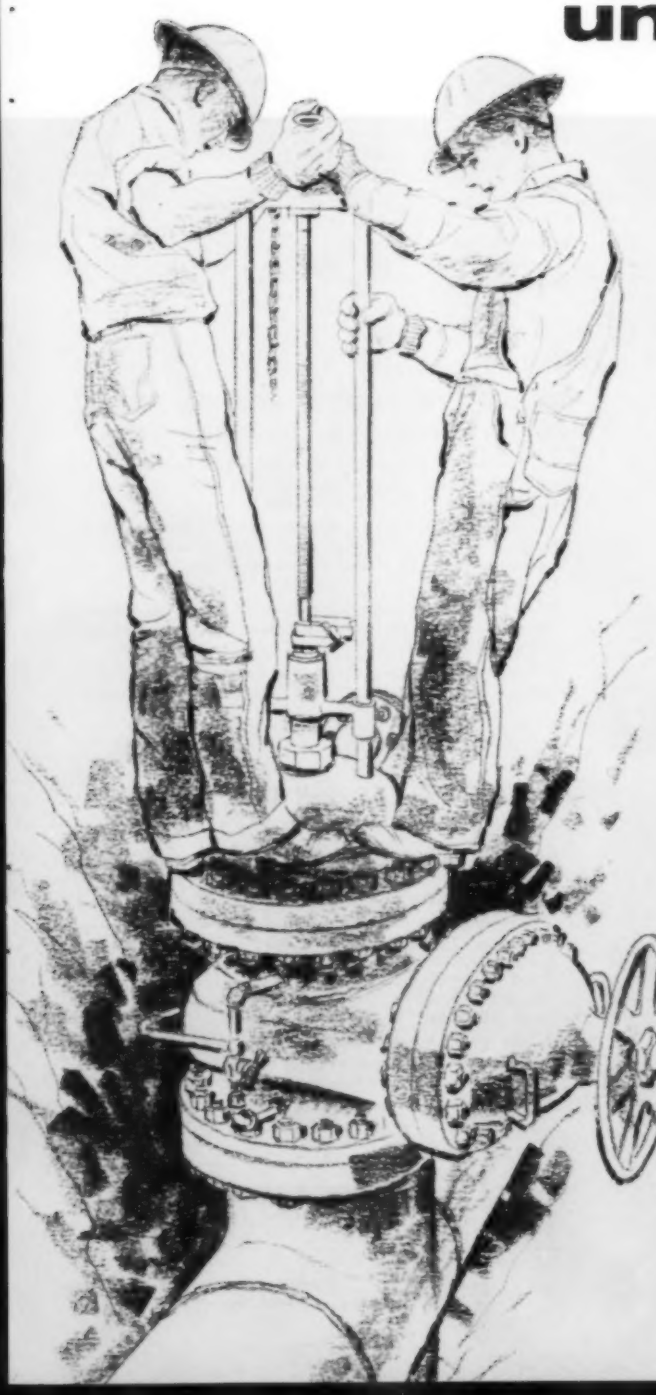
*line stopper fittings and equipment*

# stop-off lines safely under pressure!



- *isolate sections of line*
- *tie-in lines and loops*
- *repair leaks and equipment*
- *replace and install equipment*

*— without interrupting flow!*

***use this simple procedure:***

Weld or bolt stopper fittings to line.
Cut out section of pipe in fitting with drilling machine.
Mount stopping machines on fittings.
Install by-pass line.
Establish flow in by-pass line.
Lower stoppers and stop-off pipeline.
Blow-down isolated pipeline section.
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Relax and raise stoppers.
Remove by-pass line.
Plug and cap fittings.

*Turn the page for full catalog information on Line Stopper Fittings and Equipment for 6", 8", 10" and 12" lines.*

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H-17255 Welding Line Stopper Fitting

H-17265 Mechanical Joint Line Stopper Fitting

## LINE STOPPER FITTINGS

Line stopper fittings are available in welding types in sizes 6", 8", 10" and 12" with 150 or 400 pound flanges or sizes 6" and 8" with 300 or 600 pound flanges. Mechanical joint fittings may be ordered for steel or cast iron pipe in sizes 6", 8", 10" or 12". The outside diameters, bolt circles and sizes of bolts of the flanges of these fittings comply with ASA Specification B 16.5-1953.

Sectional view of completion plug furnished with these fittings. Note straight threads, "O" ring seal and automatic equalizing valve which insure easy insertion and extraction under equal pressure plus pressure-tight seal.

Steel Wedge Stopper

Steel Protector Sleeve

## STEEL WEDGE STOPPERS

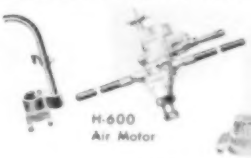
Mueller Steel Wedge Stoppers used with the 3SW and 4SW Line Stopper Units consist of an expanding mechanism inside a split steel cylinder. The cylinder is covered with a replaceable sheet of neoprene. A steel protector sleeve is furnished with each stopper to prevent damage to the cover when not in use. It also provides a means of applying bonding pressure when replacing the neoprene cover.

C1-36 Drilling Machine

## MUELLER C1-36 DRILLING MACHINE

The C1-36 Drilling Machine is power-operated for making cuts from 2" through 12½" in any size of line. Maximum working pressure up to 500 p.s.i. at 100°F. or temperatures up to 500°F. at 250 p.s.i. are possible. Boring bar travel is 36". A built-in feed indicator is used to determine the distance traveled at any time. Feed may be automatic or manual and the crank handle provides rapid tool return.

## POWER UNITS FOR THE C1-36



H-600 Air Motor

H-602 Gasoline Engine Drive Unit

Either the H-600 Air Motor or the H-602 Gasoline Engine Drive Unit may be used to power the C1-36 Drilling Machine. The air motor holder and spindle attach directly to the C1-36 without adapters. For maximum performance, 90 cubic feet of free air per minute at 90 p.s.i. are required.

The portable gasoline engine drive unit utilizes a centrifugal clutch for easier starting and to prevent damage in the event of a stoppage. Cutting time with the gasoline engine drive unit is about equal to that of the air motor at recommended engine R.P.M.

## INSPECTION FLANGE

H-17619 Inspection Flange

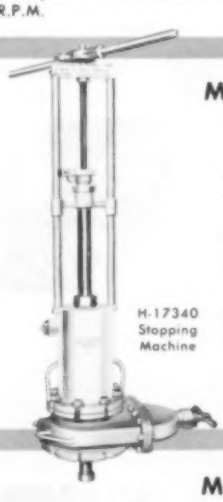
The H-17619 Inspection Flange is used with either the Unit 3SW or 4SW to visually inspect the results of the cutting operation. It is mounted on the drilling machine adapter and inspection is done under full line pressure. The retrieving rod may be used to raise any object which may interfere with the stopping operation such as chips, pipe scale or coupon, and to hold it above the gate valve until the valve may be closed and the object removed.

Shell Cutter with Hub and Pilot Drill

Drilling Machine Adapter

Valve Adapter

H-17346 Completion Machine



H-17340 Stopping Machine

## MUELLER LINE STOPPER UNIT No. 3SW

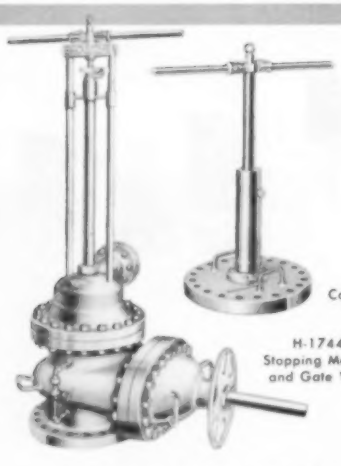
*. . . for stop-offs on 6" and 8" lines*

Mueller Line Stopper Unit No. 3SW is used to make stop-offs on 6" and 8" lines under pressures up to 230 p.s.i. at 100°F. or temperatures to 250°F. at 200 p.s.i.

The H-17340 Stopping Machine is used to insert, expand or extract 6" and 8" steel wedge stoppers. The steel body has a 2" by-pass connection. A special 9" gate valve and all needed tools are included.

The H-17346 Completion Machine has the balanced pressure design and is used to insert and extract 6" and 8" completion plugs. Tools are included.

Steel wedge stopper, valve adapter, shell cutter, hub and pilot drill are ordered according to the size of line to be stopped-off.



H-17440 Stopping Machine and Gate Valve

Drilling Machine Adapter

Shell Cutter and Hub with Pilot Drill

H-17445 Completion Machine

## MUELLER LINE STOPPER UNIT No. 4SW

*. . . for stop-offs on 10" and 12" lines.*

Stop-offs may be made on 10" and 12" lines under pressures up to 500 p.s.i. at 100°F. or temperatures to 250°F. at 375 p.s.i. with Mueller Line Stopper Unit No. 4SW.

The H-17440 Stopping Machine is used to insert, expand and extract 10" and 12" steel wedge stoppers. It has a 4" flanged by-pass connection. A special 14" steel gate valve with 400# lower flange and all necessary tools, bolts and gaskets are included. (The H-17435 with a 150# flange on the gate valve is also available.)

The H-17445 Completion Machine is a balanced pressure machine used to insert and extract completion plugs. It includes all necessary tools and an inspection flange.

Necessary attachments include a steel wedge stopper, a drilling machine adapter and a shell cutter and hub with pilot drill.

Contact your Mueller Representative or write direct for full specifications on Mueller Line Stopper Units No. 3SW and 4SW. Other units available from ¾".

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# Extraction vs. flame method . . .

## Which better tells crude's salt content?

By K. G. STOFFER

USE OF THE DIRECT flame photometric method to determine the salt content of Arabian crudes has been proved practical without prior water extraction.

Tables 1 and 2 show the correlation between salt values obtained by the flame and extraction methods on crude from the Ain Dar, Shedgum, and Abqaiq fields.

Author is chemist with Arabian American Oil Co. at Dhahran, Saudi Arabia.

**TABLE 1—AIN DAR AND SHEDGUM CRUDE OILS**

(Comparison of salt values obtained by aqueous extraction and direct-flame-photometric determinations.)

| Sample source*— | Salt (PTB)— Aqueous extraction (TEL) method | Direct flame photometric method | Difference (PTB) |
|---|---|---|---|
| G-ADW-23 | 4 | 5 | +1 |
| G-ADW-17 | 17 | 13 | −4 |
| G-ADW-17 | 24 | 24 | 0 |
| G-ADW-23 | 9 | 13 | +4 |
| G-ADW-23 | 12 | 17 | +5 |
| G-ADW-15 | 7 | 5 | −2 |
| G-ADW-23 | 72 | 70 | −2 |
| G-ADW-23 | 100 | 100 | 0 |
| G-ADW-70 | 70 | 66 | −4 |
| G-ADGOSP-2 | 2 | 2 | 0 |
| G-ADGOSP-1 | 1 | 2 | +1 |
| G-SGOSP-1 | 3 | 2 | −1 |
| G-ADGOSP-4 | 1 | 2 | +1 |
| G-ADGOSP-4 | 0 | 2 | +2 |
| G-SW-12 | 1 | 1 | 0 |
| G-SGOSP-1 | 1 | 1 | 0 |
| G-ADGOSP-2 | 0 | 1 | +1 |
| G-SW-9 | 0 | 2 | +2 |
| G-SGOSP-1 | 0 | 2 | +2 |
| G-SW-2 | 2 | 1 | −1 |
| G-ADW-30 | 0 | 1 | +1 |
| Average difference without regard to sign | | | 1.6 |
| Average difference excluding G-ADW-23 | | | 1.3 |
| Average difference of G-ADW-23 only | | | 2.6 |

*Samples from the same source are not check analyses, but represent samples from the same source over a period of several months.

**Extraction vs. flame methods . . .** It will be noted that the average difference between the salt values obtained by the extraction method and the flame method is 1.4 PTB for Abqaiq crude and 1.6 PTB for Ain Dar and Shedgum crudes.

Considered by themselves, tests on G-ADW-23 crude had an average difference of 2.6 PTB. The average difference of the Ain Dar-Shedgum values, excluding G-ADW-23, is only 1.3 PTB. In the case of G-ADW-23, it is known that it is erratically contaminated by water from the aquifer above the producing Arab "D" formation. This was surmised from other well data, but it is interesting to note the corroboration of these data by the high differences shown for analyses of the well in Table 1.

**TABLE 2—ABQAIQ CRUDE OIL**

(Comparison of salt values obtained by aqueous extraction and direct-flame-photometric determinations.)

| Sample source*— | Salt (PTB)— Aqueous extraction (TEL) method | Direct flame photometric method | Difference (PTB) |
|---|---|---|---|
| AGOSP-3 | 11 | 14 | +3 |
| AW-58 | 26 | 21 | −5 |
| AGOSP-3 | 1 | 1 | 0 |
| AGOSP-3 | 6 | 2 | −4 |
| AGOSP-3 | 1 | 1 | 0 |
| AW-57 | 32 | 30 | −2 |
| AW-21 | 0 | 0 | 0 |
| AW-29 | 0 | 1 | +1 |
| AW-15 | 0 | 1 | +1 |
| AW-41 | 0 | 1 | +1 |
| AW-57 | 33 | 32 | −1 |
| AW-55 | 0 | 1 | +1 |
| AW-59 | 0 | 0 | 0 |
| AW-62 | 6 | 3 | −3 |
| AW-63 | 1 | 1 | 0 |
| AW-57 | 149 | †150 | +1 |
| AW-57 | 12 | 10 | −2 |
| AW-51 | 1 | 1 | 0 |
| AW-64 | 1 | 1 | 0 |
| AW-58 | 8 | 5 | −3 |
| AW-57 | 28 | 24 | −4 |
| AW-57 | 30 | 29 | −1 |
| AW-72 | 0 | 0 | 0 |
| Average difference without regard to sign | | | 1.4 |

*Samples from the same source are not check analyses, but represent samples from the same source over a period of several months. †Obtained after diluting sample 1:3 with benzene.

### Test Procedure

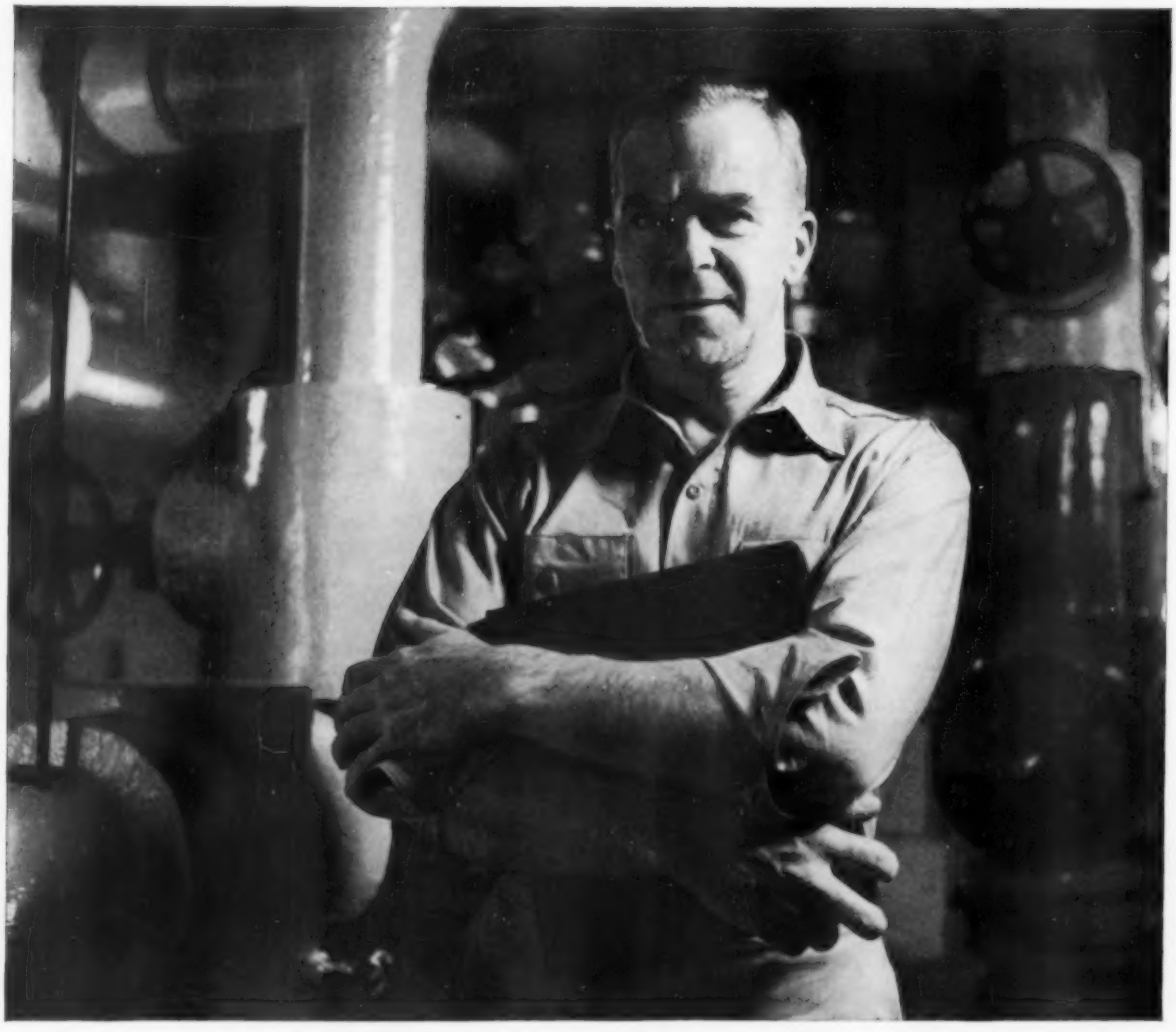
Apparatus used for determining salt in crude oil include: Beckman Model B spectrophotometer with No. 9125 flame attachment, No. 4600 photo-multiplier unit blue-sensitive phototube, and medium-bore oxy-hydrogen burner, 50-ml. graduated mixing cylinders, and 5-ml. beakers.

Reagents used are: (1) Technical-grade benzene, (2) commercial-grade hydrogen gas, compressed cylinder, (3) commercial-grade oxygen gas, compressed cylinder, and (4) sodium chloride solution. Dissolve 0.2542 g. CP crystals in distilled water and dilute to 1 liter. This solution contains 100 p.p.m. sodium.

### Calibration Curves

Prepare a calibration curve by plotting the salt content of several crude-oil samples as determined by any acceptable extraction procedure vs. the sodium line luminosity of these samples as determined by the flame-photometric procedure.

Crude oil samples containing a reasonable spread of salt concentrations, say 0 to 100 PTB, are required to construct a complete curve. Points plotted for crude from a given producing zone in the same producing area should fall along a well-defined curve. An oil well giving points consistently off the curve established for other wells of the same area should be suspected of being contaminated by water from a zone other than that from which the oil is being produced.



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**To conserve heat lost in steam-carrying pipelines, Esso Standard Oil Co. recently bought $250,000 worth of pipeline insulation lined with mineral wool and weatherproofed with sheet aluminum. The company believes it's a good idea money-wise to**

# Protect pipes with an aluminum jacket

THE INSULATION OVERCOAT will save more than $500,000 annually as it maintains the temperature of the huge quantities of fuel oil and steam which are being swapped, along with water, between the Esso Bayway refinery and Linden station of Public Service Electric & Gas Co. through more than 6 miles of large-diameter pipeline in New Jersey.

**MINERAL-WOOL** pipe covering is applied to vertical section of high-pressure line.

In exchange for both high and low-pressure steam, the refinery supplies the adjacent utility generating station with water and both high-viscosity and Bunker C fuel oil. The main trunk of the pipeline between the two facilities is composed of a battery of five parallel, carbon-steel pipes, each over 6,000 ft. long.

This multiple pipeline includes two 30-in. low-pressure steam lines which operate at 462° F. and 142 psig., one 20-in. high-pressure steam line at 740° F. and 730 psig., one 8-in., steam-traced, high-viscosity fuel line at 240 psig. and 400° F., and a 16-in. water line. In addition, two more parallel pipes, an 8-in., steam-traced Bunker C line at 150 psig. and 150° F., and a 16-in. low-pressure steam line, extend between the refinery's water-front area and the utility's generating station.

To make sure that the steam arrives at useful temperatures and to insure free flow of the viscous fuels, all of the high-temperature lines have been carefully fitted with hand-tailored jackets whose total length is over 30,000 ft.

### Materials

Pipe covering manufactured of spun mineral wool was selected to form the thermal barrier because of its high insulating value, wide service temperature range, handling ease, and flexibility. A blanket-type insulation, its felted mineral fibers are sandwiched between a sheet of expanded metal lath on one surface (the outer when applied) and strips of expanded metal on the other. The spaced strips of lath, rather than sheets, on one surface of the insulation give added flexibility to the material on its smaller-

**ALUMINUM SHEETS** are wrapped around the insulated high-pressure steam lines. The sheets are 4 ft. wide and 0.025 in. thick.

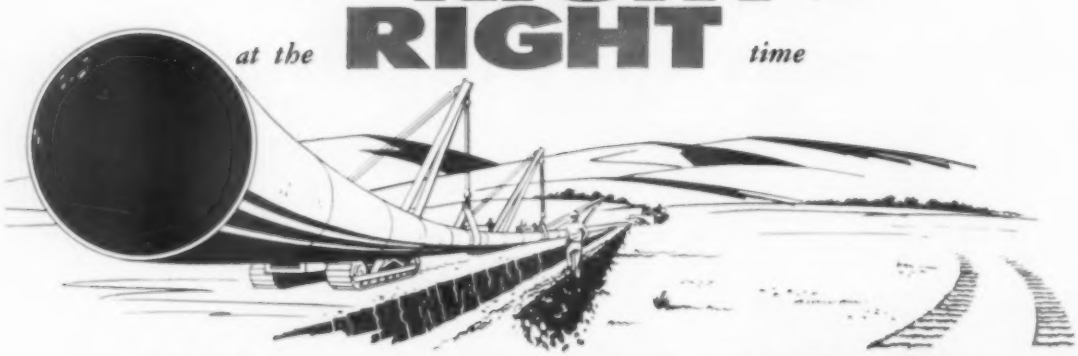
**USING A 3-IN. LAP,** the 3003-H 14 aluminum sheets are temporarily held in place by metal bands drawn together with vice-grip pliers, and then secured with sheet-metal screws.

*the* **RIGHT** *name*

*the* **RIGHT** *pipeline equipment*

*in the* **RIGHT** *place*

*at the* **RIGHT** *time*



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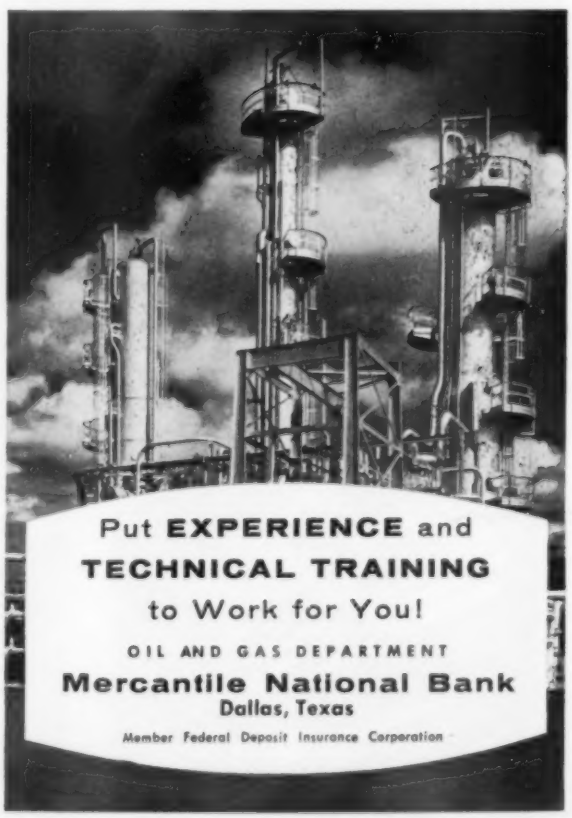

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**AT TURNS AND BENDS** in the line, white mineral-wool insulating-finishing cement and asphaltic mastic weatherproofing compound are used to finish the jacket instead of aluminum.

radius inner surface when wrapped so that the strips parallel the axis of the pipe.

Insulation thicknesses applied were: 3½ in. on the steam-traced high-viscosity fuel line; 2½ in. on the high-pressure steam line; 2 in. on the cooler 30-in. low pressure steam lines and the Bunker C line, and 1½ in. on the 16-in. steam line. The water line, which has a ⅜-in. cement liner, is not insulated.

Sheets of aluminum in precut lengths and various gages (depending upon the diameter of the lines), provide a weather-resistant shell around the mineral-wool insulation.

### Installation

The pipe covering was wrapped around the lines and the meeting edges of its outer metal-lath surface were securely tied with tie wires at both longitudinal and circumferential joints. On steam-traced fuel lines, the pipe covering was wrapped around both fuel line and tracer.

Immediately after being secured around the pipe, the insulation was covered with 15-lb. roofing felt.

The aluminum wrapper was shop-fabricated as far as possible. Cut to length by the manufacturer, the sheets were rolled and one end punched in the contractor's metal shop before delivery to the job site, to aid final installation.

The sheets were wrapped around the insulating coat and drawn tight with temporary steel bands. The ends of the metal wrapper were brought together on the side of the line with the punched ends lapping the plain ends from above for at least 3 in., preventing penetration of water into the seam.

With the sheet held tightly by the encircling bands, holes were punched in the undersheet of the lapped joint, using the prepunched holes in the outer lap as guides. The opposite ends of the sheet were then fastened together with self-tapping stainless-steel sheet-metal screws. Adjacent sheets of aluminum were lapped at least 3 in. to insure weatherproofing and to allow for thermal expansion.

At sharp turns in the pipeline where cutting the aluminum to fit the bend was impractical, a finish coat of plastic insulation and asphaltic mastic weath-


**Got Problems with AIR?**

• New Type Closure • Snap Action

• Balanced Piston With O-Ring Seal
• Grooved Ends • Easy Installation

**Get New WALKER AUTOMATIC SHUT-OFF VALVE**

*For additional information write*

**W. L. Walker Co.**

*Phone: Diamond 3-8241*
1009 South Main Tulsa, Oklahoma

**Write for Bulletin**

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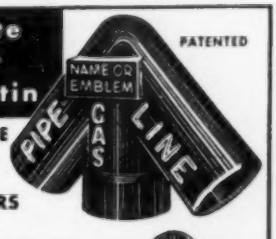


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Easiest way to file and find confidential maps, tracings, blueprints. Quality metal cabinet file with locking doors. 112 tilting tubes handle 60" prints. Tubes indexed for quick location. Ideal for field and home offices. Shipped from stock.

Patent No. 1610368. Other Patents Pending.

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Stand lifts, holds, tilts 55 gal. barrels Prevents Spillage—easily loaded.

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**WHEELING MACHINE PRODUCTS CO.**
**Wheeling, West Virginia**
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.




erproofing compound was used to finish the insulation.

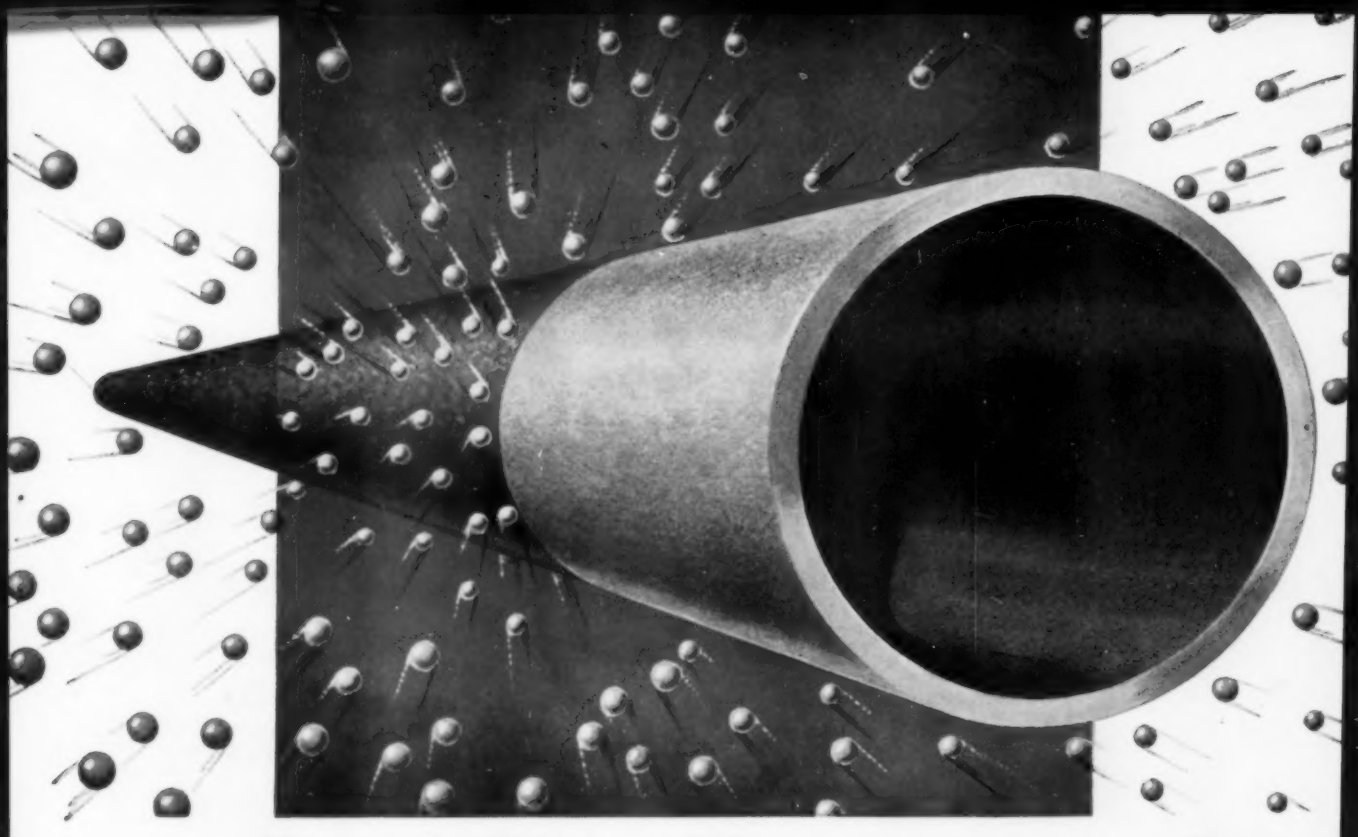
According to Esso engineers, the mineral-wool jacket reduces heat loss from both steam lines, compared to an uninsulated line, by approximately 95 per cent. This degree of efficiency may be illustrated by the fact that the aluminum covering over the hottest line, the 740° F., 20-in. high-pressure steam line, is merely warm to the touch.

**CLEANUP MAN** dresses just-finished weld.

## Welder, Cleaner Use Same Power Source

ON A PIPELINE being laid for Mene Grande Oil Co. in eastern Venezuela, the men who clean each welding pass save a lot of time by using electric power from the welding generators.

A thin blade is hooked to the front of the motor and is connected in where the welding cables go. As soon as each welder has made his pass, the cleanup man runs around the weld with this power unit in a matter of seconds.



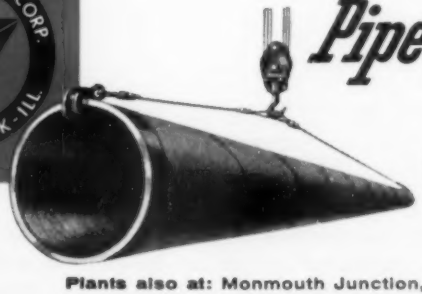
# Steel Shot Cleaning makes Pipe Protection Stay Put

Applying protective coatings to improperly prepared pipe surface makes about as much sense as building a skyscraper on sand. Pipe Line Service has always pioneered in developing new ways to insure a good bond . . . a bond that makes protective coatings practically inseparable from the pipe itself.

An outstanding example is steel shot cleaning. Special machines permit bombardment of the pipe surface with millions of steel pellets traveling at high speed. Result? Not simply removal of mill scale and rust . . . but actually an "etching" of the steel surface. This slightly roughened surface allows the protective coating to "take root"—gives you the years of protection that you should have.

We emphasize Pipe Line's steel shot cleaning process because it was one of the great steps forward in maximum protection of *your* pipe investment. It's a manufacturing extra that's provided at no extra cost . . . and one more reason for extra confidence in specifying protection by PLS!

PIPE LINE SERVICE CORP. SERVICE EQUIPMENT MATERIALS FRANKLIN PARK, ILL.



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**General Offices and Plant: Franklin Park, Ill.**

*Quality pioneers in coating and wrapping pipe for over a quarter century*

**Plants also at:** Monmouth Junction, N. J.; Glenwillard, Pa.; Sparrows Point, Md.; Longview, Tex.; Corpus Christi, Tex.; Provo, Utah; Harvey, La.

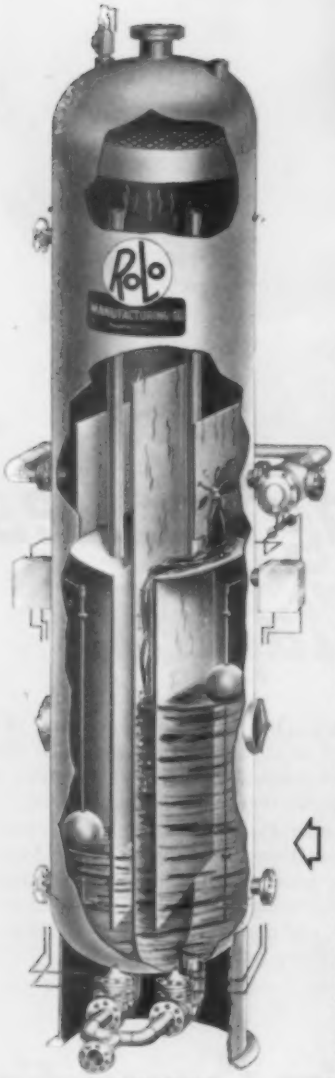
**Sales offices at all plant locations . . . and** Atlanta, Ga.; Houston, Tex.; Lincoln, Nebr.; Tulsa, Okla.

Introducing

# THE ROLO HI-CAP

## METERING SEPARATOR

***a really new metering separator principle that solves difficult metering problems such as viscous crudes, high gas entrainment and high flow rates.***



PAT. APPLIED FOR

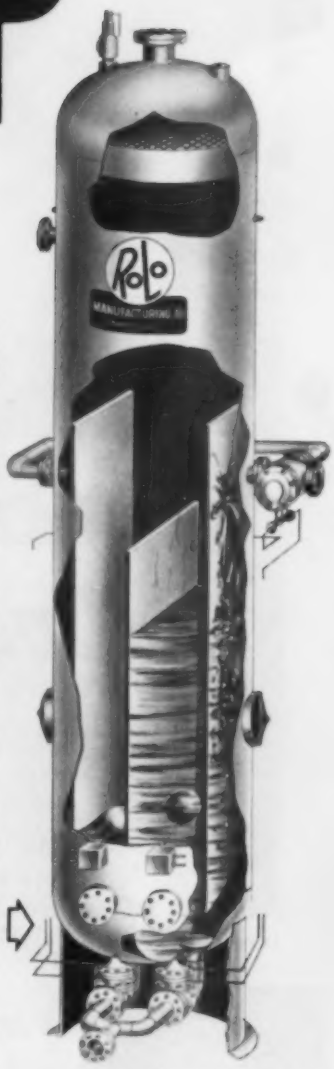
**PRINCIPLE:** The lower section is divided into two compartments (metering chambers), each with its own level controls. Production from the well enters a two-position, three-way inlet valve which directs oil into one of the two metering chambers. (Note that flow is downward through a large-area passage, and under a quieting baffle to insure minimum turbulence in meter chamber.) *Flow from the well is never stopped by the inlet valve.* Gas exits through the mist extractor.

When the metering chamber fills to its calibrated volume, level controls switch inlet valve to divert incoming oil into the opposite metering chamber. While this chamber fills, the first chamber's outlet valve (bottom) opens, discharging a calibrated volume to storage; then the outlet valve is closed. Outlet valves are sized for faster meter dumping than filling so that the discharged metering chamber awaits the filling of the other chamber. Oil volume is totalized on a counter.

Thus, the metering chambers alternately fill with and discharge calibrated volumes of oil, continuously metering *all* oil produced.

**AVAILABLE IN TWO TYPES:** TYPE A uses float action to control both the upper and lower liquid levels in the metering chambers. The float, traveling on a guide rod, moves between fixed stops, controlling the calibrated volume per cycle by float and pilot action.

TYPE B uses float action to control the lower liquid levels, but uses a *weir* to control the upper levels. Note that only one float is used in each chamber. In the illustration, incoming flow fills the right-hand chamber. When oil spills over into the opposite chamber, its float rises, switching inlet valve and diverting flow to the empty chamber. Then, after a momentary "topping out" period, the full chamber's outlet valve opens and a calibrated volume is discharged, until that chamber's float lowers, closing the outlet valve. The other chamber fills until it overflows, then inlet valve switches and full chamber discharges. *Positive* weir control of upper levels assures volumetric accuracy.



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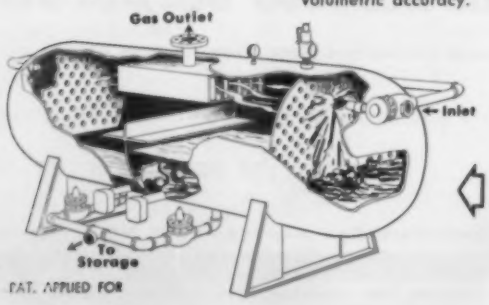


PAT. APPLIED FOR

High flow capacity is due to parallel meter operation and because meter chambers fill as fast as incoming flow rate to separator. Viscous crudes are easily handled since there is no dependence on gravity flow through restrictive piping and valves. High gas entrainment crudes can be handled by the addition of an instrument system for weight metering. (See opposite page).

***HI-CAP units are available in horizontal vessels (where horizontal separators are desired) and can be trailer-mounted as portable test units.***

*A new concept for separating and* **METERING** *of*

# VISCOUS, LOW-GRAVITY CRUDES
# HIGH GAS ENTRAINMENT CRUDES
# EXTREMELY HIGH FLOW RATES (to 50,000 BPD!)

**The Rolo HI-CAP Metering Separator consists of an oil-gas separator and parallel volume-type oil meters, all in one vessel. Its metering principle offers significant advancement over previous units, enabling previously difficult or impossible conditions to be handled with ease.**

### HOW IS HIGH CAPACITY ACHIEVED?

Parallel dump-type meter chambers **fill as fast as the incoming flow rate, there being no gravity flow through restrictive lines and valves.** And there's no time-consuming accumulation of oil while a meter is dumping . . . parallel meter chambers **continuously** meter **all** oil produced.

### VISCOUS CRUDES?

Low gravity, viscous crudes have always presented a metering problem, **but no longer** . . . With the HI-CAP, there's nothing to slow down meter filling and discharging, and even viscosities of 100,000 SSU and higher are no problem to the HI-CAP.

### HIGH GAS ENTRAINMENT?

The problem of high, variable gas entrainment in crude is answered by weight metering (as opposed to volumetric metering). Precision-engineered instrument systems (electric or pneumatic) are available on all HI-CAP units to meter oil by weight (in addition to volume). In this way, foamy or other high-gas-content oils are **accurately** metered by the simple attachment of these instruments. **(See description at right.)**

Now, the advantages of oil metering can be applied to extreme conditions . . . there's a HI-CAP unit, Type A or B, applicable to **your** conditions. Available in all diameters through 60" and larger, in vertical or horizontal vessels (latter available on trailers), and with various size valves.

Write for further information. **For an immediate proposal,** advise: maximum flow rates, gravity, viscosity, separation pressure, preference for vertical or horizontal vessel and other applicable information.

***WHEN REAL ADVANCEMENTS ARE MADE IN OIL METERING, THEY'LL BE MADE BY***


**ROLO MANUFACTURING COMPANY**

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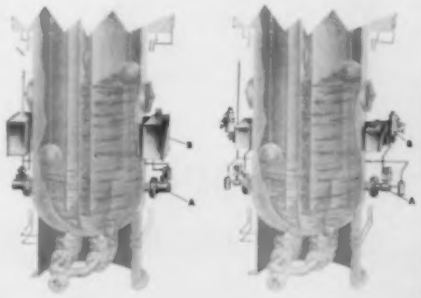
*Venezuela: Peticon (Caracas, Maracaibo, Anaco)*
*Mexico: G. Saavedra e Hijos, Avenida Morelos 31, Mexico D. F.*
*Canada: Petro-Automation Ind. Ltd., Box 72, Edmonton*


## AVAILABLE WITH WEIGHT METERING INSTRUMENTS

**Available as options on all HI-CAP units are compact electric or pneumatic instrument systems to allow metering by weight principle. Metering by weight is especially applicable to crudes of high, variable gas entrainment.**



**ELECTRIC** **PNEUMATIC**

**PRINCIPLE:**

**Two differential pressure sensing and transmitting devices (A) are provided, one for each meter section. These devices respond to changing liquid heads in the meter sections. As a meter section fills, a signal proportional to the increasing liquid level is transmitted. This signal positions a servo device in the receiver (B), which drives a pulsing device calibrated to send a pulse for every barrel of liquid. These pulses are totalized by a counter or can be recorded or remotely transmitted.**

**When a meter section is discharging, a clutch in the servo system eliminates pulses from that meter. Thus, only incoming liquid is counted.**

**A special calibrating device (graduated in degrees API) is standard; with one simple adjustment, the system can be set in infinite increments for any gravity between 5° and 50° API. (For automation, this adjustment can be made automatically on signal from test programmer.)**

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for better-than-ever
THREAD PROTECTION

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# Among the Drilling Contractors

## Brown Puts Fourth Rig To Work at Maracaibo

International Brown Drilling Co., foreign division of Brown Drilling Co., Long Beach, Calif, is putting its fourth drilling rig in operation in Venezuela.

The rig, recently assembled with all new equipment at Long Beach, is at Maracaibo. Its operation is on the sixteenth foreign contract which the Brown firm has undertaken.

The assembly, designed for 10,000 to 15,000-ft. drilling, is built around a National 80-B drawworks. It is powered with three Superior 800-hp. engines, operating through a hydraulic drive permitting "feather-weight" control. It uses an L. C. Moore cantilever-type 138-ft., 700,000-lb. capacity mast on a 10-ft. substructure.

International Brown's parent company is operating seven rigs in California. In addition, its marine subsidiary, Brown Marine Drilling Co. is on a 70-well contract drilling from an island off Seal Beach, Calif.

## Warren-Bradshaw Drilling Brings High Success Ratio

Warren-Bradshaw Exploitation Co., of Tulsa, reports a success ratio of 91 per cent in the wells drilled for its own account during the past year.

Its producing department drilled 11 wells during the year. Ten of these were completed as producers.

During 1956, the preceding year, its producing department drilled 26 wells for the company's own account. Of these 24 were producers, a success ratio of 92 per cent.

**Chickasaw Oil Co.** has a rig working on a contract job in Oktibbeha County, in northeastern Mississippi's portion of the Black Warrior Palezoic basin. It is a rank wildcat test with a 5,200-ft. objective. Operators are J. W. Sparks and John Buie. Location, at 1 Barron Estate, in 8-17n-12e, is a mile northwest of Sturgis.

**Falcon Seaboard Drilling Co.,** Tulsa and Houston, is putting a rig in the new Bancker field, 7 miles south of Abbeville, in Vermilion Parish. It will drill for J. Ray McDermott & Co., whose location, at 1 Weill et al, in 60-13s-3e, is 700 ft. northwest of Union Oil & Gas Corp.'s 10,575-ft. gas-condensate well, completed last November, and northeast of the field's discovery well, completed last August. The latter is productive of oil in a 10,620-ft. sand. The new operation, permitted to 12,000 ft., is McDermott's first test.

## Haney-Williams Firm Gets Pacific Offshore Project

Western Offshore Drilling & Exploration Co., newly formed maritime subsidiary of Haney & Williams Drilling Co., Long Beach, Calif., will be the contractor on the offshore drilling project Standard Oil Co. of California and Humble Oil & Refining Co., as joint operators, are undertaking south of Santa Barbara, Calif.

The drilling will be done from a platform now under construction at National Steel & Shipbuilding Co.'s yards at San Diego. Location of the platform will be about 2½ miles offshore from a point south of Summerland.

Operators propose to drill up to 25 wells from the platform, which will accommodate the drilling of two wells simultaneously.

**Penrod Drilling Co.,** Shreveport, is getting started on its third deep test in the Fort Jackson area, Plaquemines Parish, southeastern Louisiana, where it is drilling for Hunt Oil Co. and Pan American Production Co. It has just finished a 16,021-ft. hole in the area as its second job. The new operation (3 L. L. & E., in 42-20s-30e) is set up as a 15,00-ft. test.

**Falcon Seaboard Drilling Co.,** Tulsa, has the contract on the deep test Max Pray, of Chicago, is undertaking in southeastern Wheeler County, Texas Panhandle. The hole is scheduled to be carried to the granite, expected about 11,500 ft. Location, at 1 Mills, in Section 37, Block 4-T, H&GN Survey, is about 12 miles southeast of Wheeler.

**Grey Wolf Drilling Co.,** Houston, has scheduled a rig to drill a deep test for General Crude Oil Co. at a long step-out location northeast of East Gibson field, west of Houma, in Terrebonne Parish, Louisiana Gulf Coast, on General Crude's McCallam lease, in 27-17s-16e, is about 1¾

*Testing Time Saver...*

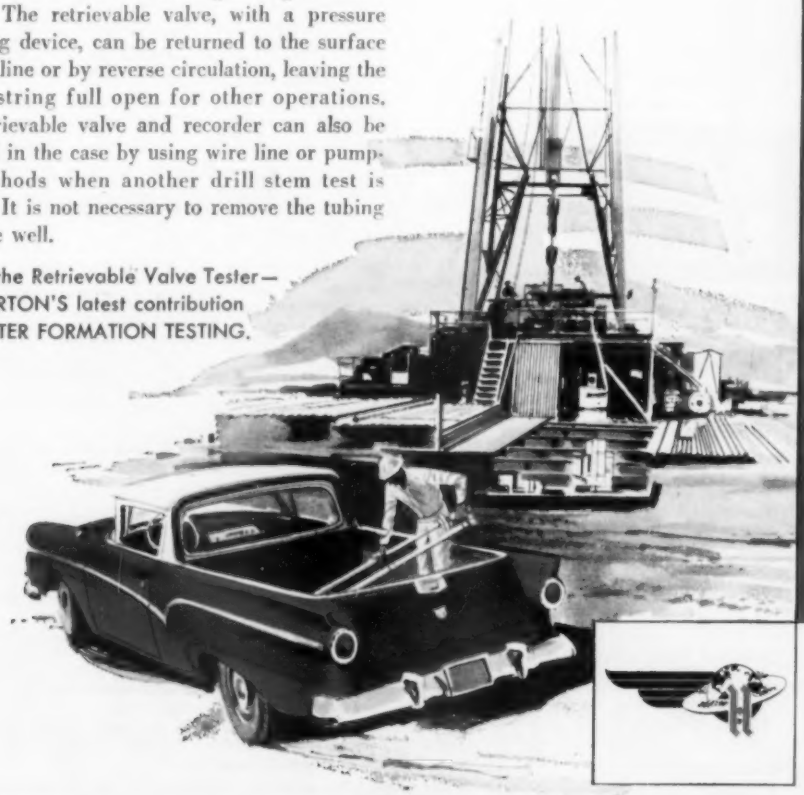
# HALLIBURTON'S ONE TRIP
## RETRIEVABLE VALVE TESTER

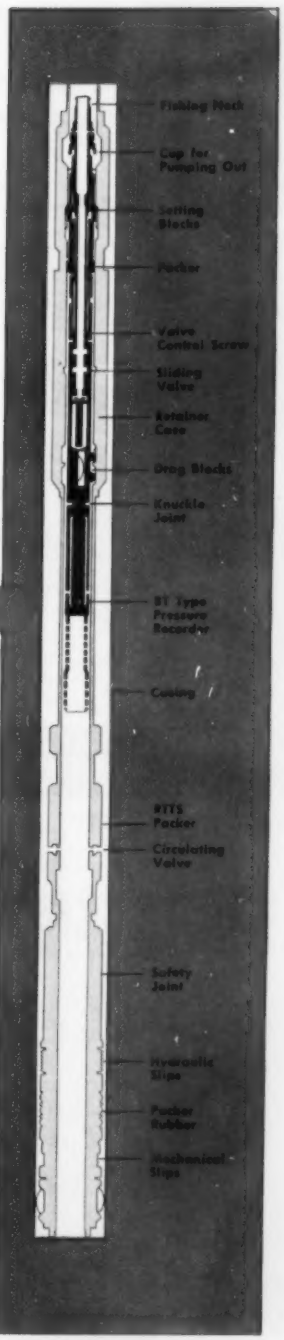
Reduced rig time during well evaluation and completion operations results when you include Halliburton's Retrievable Valve Tester in your string. Used above the RTTS Packer, the Retrievable Valve Tester permits several operations such as drill stem testing, cement squeezing, treating, perforating and simultaneous gamma-collar logging without the usual time-consuming round trips with tubing between operations.

### 30 SECOND TECHNICAL DESCRIPTION

This versatile testing tool consists of two assemblies—the retainer case and the retrievable valve. The case is run in the tubing string with the packer. The retrievable valve, with a pressure recording device, can be returned to the surface by wire line or by reverse circulation, leaving the tubing string full open for other operations. The retrievable valve and recorder can also be replaced in the case by using wire line or pumping methods when another drill stem test is desired. It is not necessary to remove the tubing from the well.

**Specify the Retrievable Valve Tester—HALLIBURTON'S latest contribution FOR BETTER FORMATION TESTING.**






RETAINER CASE & RETRIEVABLE VALVE TESTER

**HALLIBURTON** OIL WELL CEMENTING COMPANY DUNCAN, OKLAHOMA

**TESTING SERVICES**

HALLIBURTON—SETS THE PACE IN DRILL STEM TESTING

Protects threads—prevents galling and seizing—gives tight seals—permits easy separation—lengthens drill string life. These are reasons why 'Bestolife Lead Seal Tool Joint and Casing Compound has been the standard of the oil country for over twenty-five years. Unconditionally guaranteed.

Packed in 1¼, 5, 20 and 50 lb. containers. Sold by leading supply houses the world over.

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miles from production. Permit calls for a 11,000-ft. test. **Rimrock Tidelands, Inc.,** New Orleans, is about to finish up on a well it has been drilling at East Gibson. Its operation, on the north side of production, is for Jackson & McCain. It was drilled to 9,606 ft., and is making a gas-condensate producer with pay at 8,463-71 ft.

**Larco Drilling Co.,** Jackson, Miss., has a Gulf Oil Corp. contract for a 14,500-ft. test planned for Gwinville field, in Jefferson Davis Parish, southern Mississippi. Lower Cretaceous-Rodessa and Sligo horizons are its objective. Production at Gwinville now is from Upper Cretaceous Eutaw and Tuscaloosa sands.

**Del Mar Drilling Co.,** Corpus Christi, is drilling on a new contract operation in the Violet area, west of Corpus Christi, in Nueces County, lower Texas Gulf Coast. L. A. Douglas, the operator, plans a 7,000-ft. test. Location is at 1-B Heuermann.

**K. L. Kellogg & Sons,** Compton, Calif., are getting well down on a 9,800-ft. Stevens sand test they are drilling for F. M. Taylor at a wildcat location south of Paloma field, 15 miles southeast of Bakersfield, in Kern County, California. The test is Taylor's 27X-11 Superior-St. Sure, in 11-32-26.

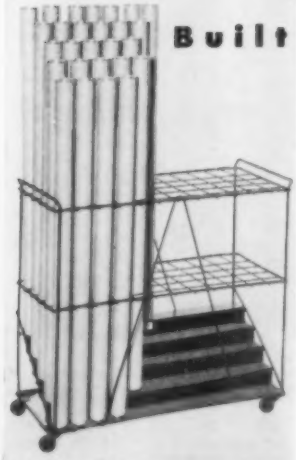
**Sunnyland Contracting Co.,** Rayne, La., has a new 7,500-ft. operation in Wayne County, eastern Mississippi. It is a contract job for Ralph Stanley, of Waynesboro. Location is 6½ miles east of Waynesboro, at 1 Howse, in 8-7n-6w. Lower Tuscaloosa sands will be tested. Location is in wildcat area.

**Formby Drilling Co.** is working for Trice Production Co., of Longview, Tex., at a wildcat location about a mile west of Henderson, in Rusk County, East Texas. It is a 7,500-ft. test to the Travis Peak. It is being drilled as the operator's 1 Bynum.

**Woolf & McGee,** Tyler, Tex., are on a new contract job north of Security, in Concordia Parish, eastern Louisiana. It is a 5,950-ft. Wilcox test for Roger J. Bassett and others, of Shreveport. Location, at 1 Thomas, in 30-7n-7e, is about 1½ miles northwest of a lone, small oil well, designated as Normandy field.


FRONTIER

MAP RACKS



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60 openings, each 2½". Shipping weight — 29 lbs. 33" wide, 14½" deep, 33" high.

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1. The mineral estate under 45.56 acres of land in Cameron Parish, Louisiana, known as the Sabine Pass Light House Station.
2. The mineral estate under 80 acres of land on Grand Terre Island, Louisiana, known as the Barataria Bay Light House Station.
3. The fee title to 3.114 acres of land in Plaquemine Parish, Louisiana.
4. The mineral estate under 232.83 acres of land in Nueces County, Texas, known as Ward Island.
5. The mineral estate under 220 acres of land in Nueces County, Texas, known as the former Outlying Field No. 33 to the Naval Air Station at Corpus Christi, Texas.
6. The mineral estate under 96.24 acres of land in Tom Green County, Texas, known as the San Angelo Fish Cultural Station.

The property will be offered in individual tracts and as one item.

The property has been screened against the known defense and other requirements of the Federal Government.

HOW, WHEN AND WHERE TO BUY

**HOW TO BID:** All bids must be submitted on Bid Form GSA-R-304 which gives detailed descriptions, terms and conditions of sale, and instructions on how to bid. For your copy, write or call GSA Business Service Center, Room 101, 1114 Commerce Street, Dallas, Texas. For further information write the PBS Disposal Branch at the address below or call Riverside 8-5611, Station 2131.

Sealed bids will be received at GSA Business Service Center until 1:00 P. M., CST, March 4, 1958, at which time and place they will be publicly opened and read.

May be inspected at any time.

GENERAL SERVICES ADMINISTRATION
PUBLIC BUILDINGS SERVICE
1114 Commerce Street — Dallas 2, Texas

# Versatile Emergency Jack Lifts 15 Tons at 4 Lifting Points

Lifting, skidding and leveling rigs; pushing, pulling and positioning machinery; supporting pipe and equipment are just a few of the oil field jobs done easily with the versatile Simplex No. 310A Emergency Jack. It handles full 15-ton capacity at four points; has 13" lift with minimum toe height of 2¼"; tilts on base for use at any angle.

## Unique "Center-Hole" Hydraulic Units Pull . . . Lift . . . or Push in Any Direction

Pulling or installing cylinder liners, valve seats, pinions, bushings, wrist pins, keys, wheels, gears, etc. is fast and easy with a Simplex "Center Hole" Hydraulic Unit. Also serves as heavy-duty jack or hydraulic press. Remote-controlled and self-contained models in 10 to 100 tons capacity. "Center-Hole" tubular construction simplifies rigging, eliminates torque, makes pulling easier.

**OTHER SIMPLEX OIL FIELD JACKS** . . . include Lever, Screw and Standard Hydraulic types in a complete range of sizes and capacities.

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## Miniature Jack for 50c!

This 3" high Simplex Screw Jack will lift 500 pounds two inches. Has all operating and construction features of larger screw jacks. Also is ideal desk ornament, paper weight. 50c ea. Shipped prepaid. Send cash or check to:

**TEMPLETON, KENLY & COMPANY**
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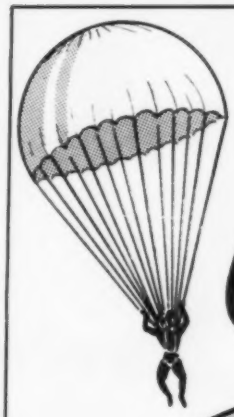
A. C. Templeton, 5627 Del Roy Drive, Dallas, Texas



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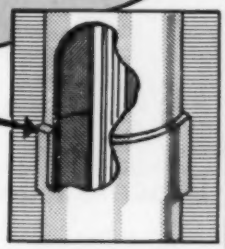
**KANEWELD**

*BEVELEDGE* CASING*



*Both edges of every length of KANEWELD Casing are *beveled* to assure a weld that is *stronger, safer, surer.*

Only KANEWELD Beveledge* CASING affords the *certainty* that positively prevents costly casing failures. When the hole is cased with KANEWELD, the joints are actually stronger than the pipe itself, providing a "one-piece" wall of cold-rolled steel all the way down.

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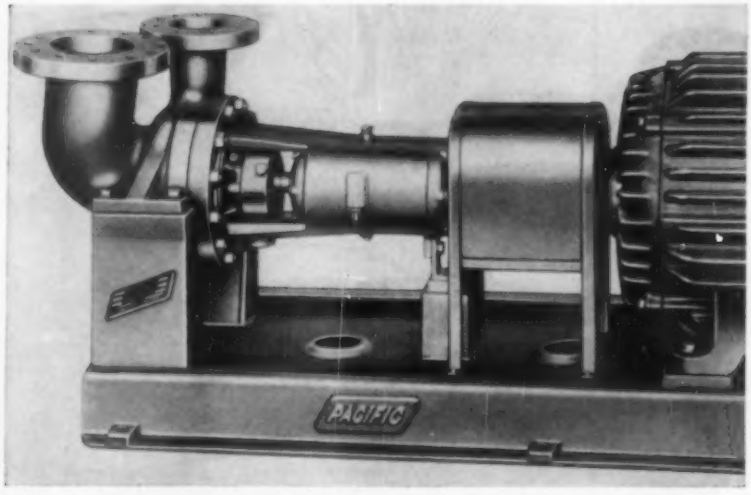
SHOWCASE...

# NEW EQUIPMENT




## Process Pump Features Interchangeability

For rapid dismantling and reassembly, the new Pacific SVA line of 21 pumps is divided into four size groups having 20 major parts interchangeable within each group. The single-stage pumps feature a double-wearing-ring impeller, angular-contact thrust bearings, and either a mechanical seal or conventional packing. The rotating elements—shaft, shaft sleeve, impeller, wearing rings, head, packing glands, bearings, and housing—form a unitized assembly. This simplified design permits rapid dismantling and reassembly which reduces maintenance costs.

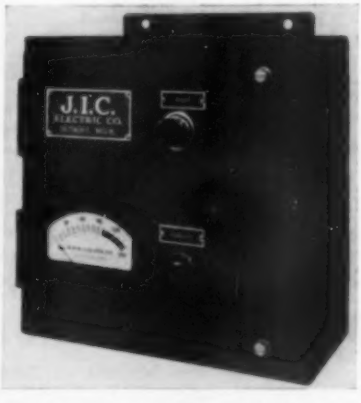
Developed for transfer of hydrocarbons, chemical solutions, acids, and condensate, SVA pump has a capacity of 15 to 1,600 gal. per hour at a working pressure of 500 psig., a differential head of 700 ft., speed of 3,600 r.p.m., and temperature to 300° F. **Write or call: Pacific Pumps, Inc., One of the Dresser Industries, Huntington Park Calif., for details on SVA line of pumps.**

●

## Overload Switch Protects Electric Motors

Developed to control overload conditions of both fractional and multiple-horsepower electric motors, the load switch handles all horsepower ranges in a single unit. It can be readily installed in any electrical circuit and adjusted so any predetermined overload will activate visual or audio signals and open and close contacts to stop a motor, the maker reports.

Operating from 110-volt, 60-cycle power, the loadswitch uses no vacuum tubes or complex electronic devices, the maker says. It requires only two simple adjustments to set up. Contained in a compact cabinet measuring 12 by 14 by 6 in. (NEMA 12), the device comes in four standard




models. These include a single overload relay, single overload relay with timer, double overload relay on which one relay warns of a limited overload and the second stops the machine on excessive overload, plus the same unit (double-overload relay) with timer. **Write or call: J. I. C. Electric Co., 19255 West Davison, Detroit 23, for details on load switch.**

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

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Described in OIL AND GAS JOURNAL - Issue of **February 10, 1958**

NAME..... TITLE.....

COMPANY.....

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CITY..... STATE.....

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We know a production superintendent who's a frequent visitor at Bethlehem Supply stores. Says he likes to go in because they're always so clean, neat, and well-stocked. Says he also likes the friendly atmosphere, and the helpfulness of the store personnel.

Hearing him talk that way always makes us feel good . . . because that production superintendent is so typical of many others in the areas we serve.

We're mighty sure that customer good will has helped us build from virtually nothing, twenty years ago, to a network that now includes sixty-one stores. Today Bethlehem Supply covers a pretty big territory—from eastern Illinois to the Pacific, and from the Gulf Coast to North Dakota. That's our domestic spread. And Bethlehem Supply Company of Canada, Ltd. has recently opened an office at Calgary, Alberta, and a full-fledged store in Edmonton.

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**BETHLEHEM SUPPLY**

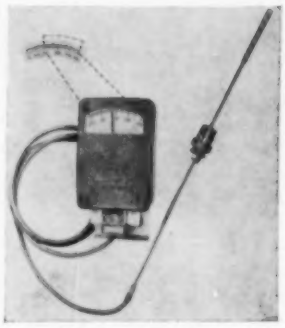
BETHLEHEM STEEL

SHOWCASE . . .

# New Equipment

## New Temperature Transmitter Is Sensitive

The compact indicating temperature transmitter is designed for pneumatic transmission of temperature measurements in ranges from 100° to 600° F., with spans of 100° and 200° F. With the upper, more-sensitive, portion of the conventional vapor-pressure thermal curve expanded over a



4½-in. scale, the Model 44 temperature transmitter provides as much as 30 to 50 per cent greater sensitivity, the maker reports. Use of the expanded scale increases the output-pressure change per degree of temperature change, providing increased receiver-control action and good readability at both the transmitter and receiver.

Indication at point of measurement is accomplished by a red pointer and black-on-white scale markings with widening divisions across the upper portion of range. These provide visibility from as far away as 20 ft.

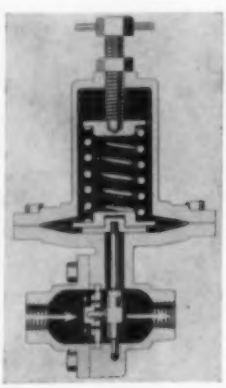
The vapor-pressure thermal system includes a 4 by ⅜-in. bulb, 18-in. bendable bulb extension, adjustable union connection, and polyvinyl-plastic-covered bronze tubing over the copper capillary. The Class II thermal system requires no ambient-temperature compensation. It may be replaced easily for range change.

Liquid or gas-filled systems are available for temperatures above 600° and below 100° F. **Write or call: Foxboro Co., Foxboro, Mass., for details on Model 44 indicating temperature transmitter.**

●

## Valves Are Available In Monel, Aluminum

All OPW-Jordan sliding-gate regulator and control valves are now available in Monel and aluminum for corrosive-fluid services. The valves also come in bronze and cast iron. Temperature control, diaphragm motor, sampling, and mixing valves are included in the line. Sizes range from ¼ through 6 in. The Monel valves are rated at 200 psi. WSP and 600° F.



All valves feature sliding-gate seat construction. They are suited for steam, air, water, oil, gas, and chemical services. **Write or call: Jordan Industrial Sales Div., OPW Corp., 6013 Wiehe Road, Cincinnati 13, for details on Monel and aluminum valves.**

**Here's Real Proof of the Superiority of Hartzite Plastic Cooling Tower Fans**

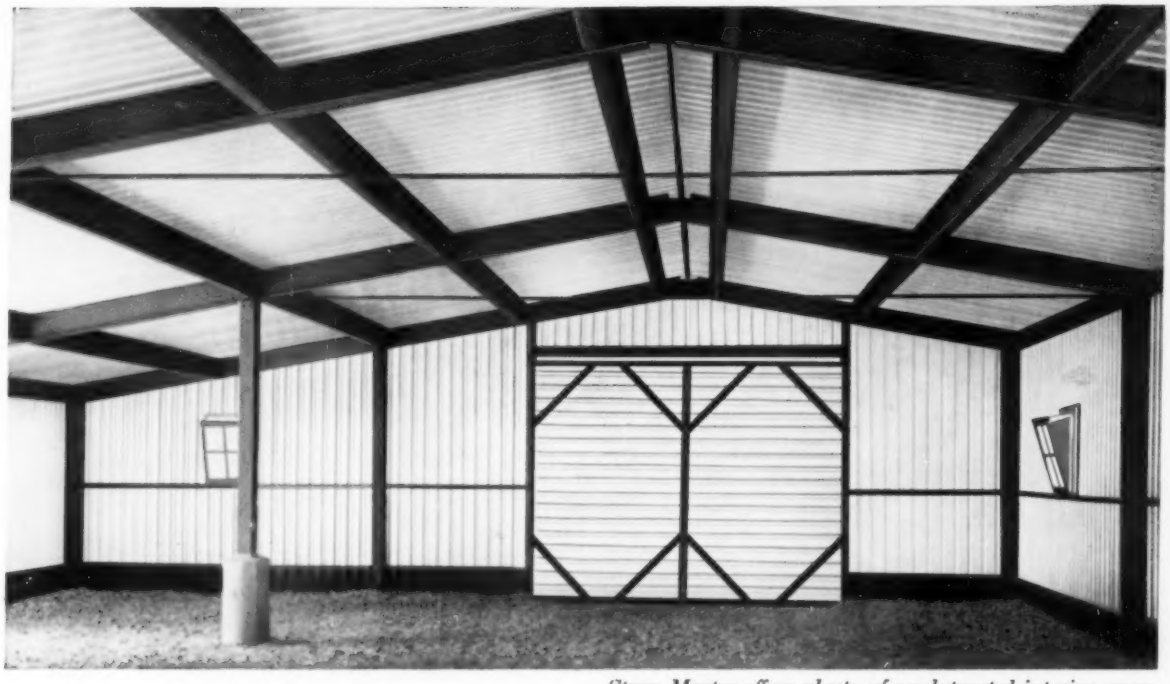
Since Hartzite plastic was introduced in 1941, one leading producer of petroleum products* has purchased 411 Hartzell cooling tower fans with Hartzite plastic blades. This figure does not include the additional units supplied to this customer by the cooling tower manufacturers who use Hartzell fans on their towers.

What better proof could you ask of the superiority of Hartzite plastic fans than this complete acceptance by one of the largest users of such equipment. Beyond all doubt, Hartzite has proved itself to this customer and to thousands of other cooling tower operators as the fan blade material most resistant to vibration, corrosion, abrasion and mechanical damage.

For complete details on Hartzell fans, and how they can help you cut cooling tower maintenance costs, write today for free Bulletin A-111 or call your nearby Hartzell field engineer.

*Name on request.

**HARTZELL** Propeller Fan Co.
Division of Castle Hills Corp.
72 Thomas Blvd. Piqua, Ohio



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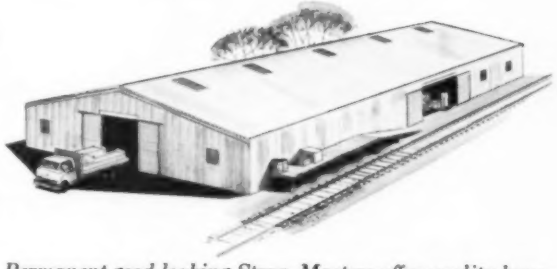

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# There's a lot more difference in these **MISSION PISTONS** than just ten years!

Although these two Mission Pistons look a lot alike, the 1957 model at the left will give much better service than the 1947 model at the right.

With the 1957 model, you can take advantage of far higher pump pressures than you could when using any other pistons — including Mission Pistons of ten years ago.

Or, if you don't require high pressures, you can get far longer service life than before.

Why? There are many good reasons! In the past ten years for example, *27 improvements*

*have been incorporated into Mission Pistons.*

Most of these improvements, such as advances in piston rubber compounds, can't be seen, but they mean that today's Mission Pistons are giving excellent service under jet drilling conditions that would have been considered impossible only ten years ago.

In addition to the changes actually made, Mission Engineers have conducted 371 *test pump laboratory and field tests on piston rubbers alone in just the last three years.* That's an average of over 120 tests per year.

This kind of research means lower costs, less down time, better slush pump performance and faster drilling for you. It is an important reason why more Mission Pistons continue to be used than all other makes combined. You can get Mission Pistons and Mission Piston Rubbers through supply stores everywhere.

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**SHOWCASE** . . .

# New Equipment

## Gas-Lift Valve Has Only Two Moving Parts

Either continuous or intermittent flow can be achieved without pulling the string, using this simplified Otis gas-lift valve. The valve has no metal moving parts.

The two moving parts are a main valve and a reserve-check valve. Both parts are of a resilient. Hycar composition which, the maker says, effects a bubble-tight seal, even with sand-laden fluids. Identified as the Type C, the valve is built around a full-opening mandrel. It operates completely by casing pressure—independent of tubing pressure.

When the valve is used in intermittent operation, minimum amount of gas is required to lift the fluid load. A system can be changed from intermittent to continuous flow simply by changing the wellhead adjustments.

The casing-pressure-operated principle of the valve allows it to be opened or closed at any predetermined casing pressure—regardless of the tubing pressure at the time. This balanced-valve feature saves gas that ordinarily is wasted with unbalanced valves operated by combined tubing and casing pressure, the firm says. **Write or call: Otis Engineering Corp., P. O. Box 35206, Dallas, for details on Type C gas-lift valve.**

●

## New Truck Built for Heavy-Duty Operation

The new gasoline-powered Ford heavy-duty truck line includes a wide selection of tilt-cab, conventional and tandem models ranging from 25,000 to 51,000 gross vehicle weight and 50,000 to 75,000-lb. gross cargo weight.

With displacements of 401, 477, and 535 cu. in., the V-8 engines develop gross horsepowers of 226, 260, and 277 at a 7.5-to-1 compression ratio, giving the needed power for hauling requirements while allowing efficient use of standard gasoline.

Engine features include: (1) sodium-cooled exhaust valves, (2) stellite-faced intake valves, (3) alloy-steel inserts for all valves, and (4) Hypalon insulation on the high-voltage wires. The piston tops are step-shaped for high turbulence, efficient combustion, and effective sweeping action during the exhaust cycle. The oil pump and oil cooler are positioned inside the engine. A three-stage cooling system is used for efficient engine operation.

All models in the line use double-channel frame construction with a section modulus up to 25.65. They have a 13-in., two-plate clutch. **Write or call: Ford Div., Ford Motor Co., Dearborn, Mich., for details on heavy-duty truck line.**

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36″
2″

*Design + precision + quality that do the job in the one best way...*

Size in Rollway Thrust Bearings—big or little—is a mere matter of operating "geometry" and of the machinery to produce it. But design, precision and quality are dimensionless quantities that vary widely according to loads, speeds, temperatures . . . yet in the end sum up to a single constant: *"To do the job required in the one best way."*

Of course, we're proud of this 2¼ ton bearing with its thrust load capacity of 4,630,000 lb., its diameter of almost 3′-0″ and its 3 roll assemblies with 6 precision thrust plates matched to equalize load and deflections for each stage. But we're equally proud of the little 2 incher in Design Engineer Grigson's hand. Despite the great difference in size, each has been carefully worked out *"to do the job required in the one best way."*

Whether you want a bearing for an oil rig, an extruder, a pulp mill jordan, a crane hook, a heavy duty lathe and countless other uses, Rollway has one that will do the job "in the one best way."

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**5 Standard Types:**

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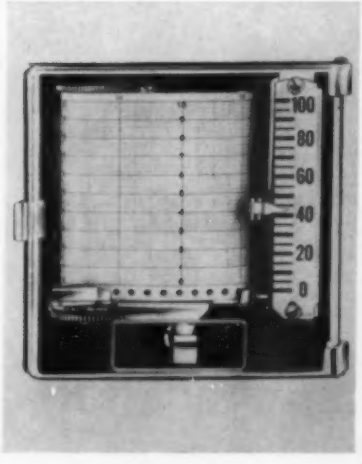
- Single acting
- Double acting
- Special-purpose types to your order

**Our engineers will gladly consult with you regarding the standard or special-purpose types you need.**

ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Milwaukee • Seattle • Houston • Philadelphia • Los Angeles • San Francisco

## Pressure Gage Records On Strip Chart

With ranges available from 0-3 to 0-60 psi. and recording on a 3-in. strip chart, the gage is available with elements of Ni-Span C, beryllium copper, and phosphor bronze. The recording chassis can be plugged in without tools from the front of the panel.




Several versions of the instrument are available. One will record and indicate pressure. Another will record and indicate one pressure while recording a second. A third version records and indicates one pressure and indicates the second. All models are available with either pneumatic or electric chart drives in a variety of chart speeds. Write or call: **Bristol Co., Waterbury 20, Conn., for details on recording pressure gage.**

•

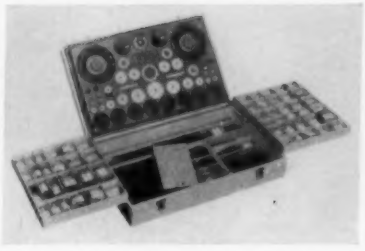
## Construction Kit Speeds Machine Design

Precision working models of practically any type of machine, drive, or mechanism can be made with the kit, according to the maker. The FAC construction system uses a basic construction concept of round rods and beams. These are assembled into frameworks by rugged clamping means. A variety of such precision-machined mechanical components as ball bearings; spur, bevel, internal, and worm gears; gear racks; ratchets; sprockets; pulleys; sheaves; couplings; springs; wheels; disks, and universal joints are utilized in the system.

A user can construct such smooth-operating precision-detailed mechanisms as reciprocating motions, slide motions, geared transmissions, differentials, and coil-spring devices with the kit components.

Created by a Swedish inventor named Mark Sylwan, the kit comes in two sizes. Each is supplied with complete instruction manuals. The FAC-X1 kit, which lists for $250, has 2,700 parts. The top section of the sturdy, hardwood case has an assortment of gears and other machine elements. The bottom section has dividers for various components and fasteners which are plastic-packaged. The case measures 23½ by 15 by 2¾ in. and weighs 24 lb.

The larger kit is the FAC-X2. This kit lists for $400. It has 4,700 parts selected to meet industrial-machine design development requirements. Its case has three sectioned tiers in addition to the top section. It measures 23½ by 15 by 4⅜ in. and weighs 39 lb. Extra parts for expanding the basic kits can be obtained. **Write or**



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*Designed in France by Sud Aviation, the Alouette is presently assembled and marketed by Republic Aviation's newly formed Helicopter Division which parallels the Alouette in originality of concept ➤ ➤ ➤ Republic's Helicopter Division is the first organization of its kind to devote its facilities primarily to commercial helicopter needs. Complete manufacture of the Alouette in the United States is Republic's ultimate, short-range goal. ➤ ➤ ➤ The Alouette has already built up an impressive flight log of more than 26,800 miles throughout its U. S. tour. During its demonstrations in 31 cities to commercial air transport companies, feeder line operators and private enterprise, it proved its superiority conclusively . . . both economy-wise and flight-wise.*

*Because of its extraordinary versatility, it can do many jobs heretofore considered outside a helicopter's capabilities. Thus the Alouette is ideally suited to the needs of a broad range of industries.*

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CM1

TIME TESTED
MACCO
GAS LIFT

**MACCO DUAL COMPLETION EQUIPMENT**
**"Capsule" Mandrel and CM1 (1" O.D.)**
**Gas Lift Valve**

The "capsule" type mandrel is available from stock for all standard dual, macaroni, and slim-hole lift. Special sizes are manufactured upon request. With the valve and check valve mounted inside, this type of mandrel provides extra large flow areas for the well fluids. The producing zones of parallel or concentric dual completions may be simultaneously lifted by either a "common" or "separate" gas supply. Macaroni tubing lowered inside of the regular tubing has proved a highly successful means of lifting wells where it is objectionable to pull the regular tubing. Efficient lift inside of small liners is also made possible.

The Macco fluid operated valve is particularly suited for dual completion lifting. A typical installation consists of separate, parallel strings of tubing, each equipped with Macco fluid operated valves mounted in capsule mandrels. The fluid of each zone controls the opening and closing of its valves. The casing annulus serves as the gas supply for each string of valves. Valve interference is eliminated and each zone is lifted independently of the other. No surface equipment other than a choke in the gas input line is needed.

Macco manufactures many different types of dual completion equipment to fit any well requirement. For further information, write for Brochures No. 3-12, 3-21, and 3-31.

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*division of* **PETTIBONE MULLIKEN CORPORATION**


**SHOWCASE . . .**

# New Equipment

**call: FAC Div., Overseas Commodex Corp., 9551 Grand River Avenue, Detroit 4, for details on machine-construction kit.**

•

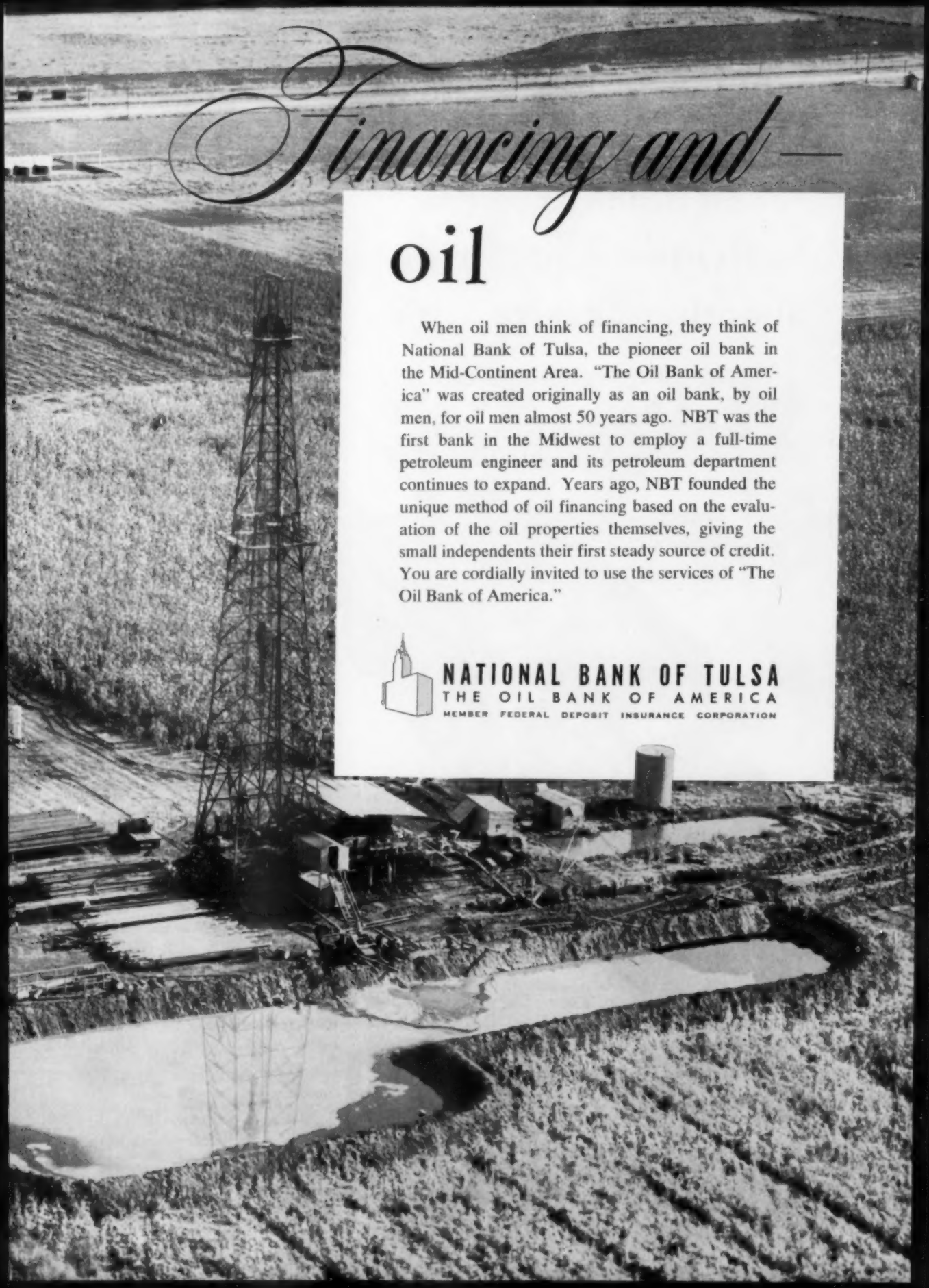
## Spherical Process Reactor Is Glass Lined

Lined with acid and alkali-resistant glass, the vessel offers operating pressures at least 130 psig. greater than those previously available, the maker reports. The unit's spherical shape is is said to permit the thinnest wall possible for the containment of any given amount of liquid under pressure.

The thin wall, combined with a high liquid velocity along the heat-transfer surface, reportedly provides another advantage. The over-all heat-transfer coefficient is increased, even though the heat-transfer area is about the same as that in a conventional reactor of the same size. Another advantage cited is that the large liquid surface area permits higher vaporization rates while reducing foaming tendencies.

Specifications for the spherical reactor include: (1) a design pressure, internal, of 330 psig., and jacket, 250 psig; (2) a design temperature, internal, of 500° F., and jacket, 650° F., and (3) a corrosion allowance of $\frac{1}{16}$ in. for the jacket area.

The spherical reactors will be offered in most common sizes. It is constructed under the 1956 ASME Code, Section VIII. The liner is Grade B SA285 steel and the jacket is Grade A SA212. The lining is Glascote acid-alkali chemical-resistant glass No. 338. **Write or call: Glascote Products, Inc., 20900 St. Clair Avenue, Cleveland 17, for details on spherical processing reactor.**



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*Anywhere*
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*Any time*

The HOMCO Electronic Free Point Indicator and String Shot may be used in conjunction (Patent No. 2,686,039) saving valuable work time. The HOMCO Free Point Indicator — the world's smallest free point indicator, only 1⅜" O.D. — finds the lowest point in the stuck "fish" and the HOMCO electrically controlled String Shot backs the loose pipe free. Also available is the HOMCO Washover Back-Off Tool which permits washing over and recovery of free pipe with only one round trip of the fishing string.

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- DIRECTIONAL DRILLING
- FISHING OR CUTTING
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HOUSTON OIL FIELD MATERIAL COMPANY, INC.

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SHOWCASE . . .

## New Literature

**Packaged Adsorbents** for use in all chromatographic instruments are reviewed in new four-page Bulletin 853. It discusses proper selection of the adsorbent for the class of sample and analysis to be made. Twenty-eight different ready-to-use partitioning agents and 10 different properly sized solid adsorbents available are listed and priced in standard-size packages. Originally developed for use with Kromo-Togs and other Burrell analyzers, the adsorbents now are offered to all users of any chromatographic apparatus as a single source of supply. **Write or call: Burrell Corp., 2223 Fifth Avenue, Pittsburgh 19, for Bulletin 835.**

●

**Corrosion of Ferrous-Metal Tubing in Refinery Service** is the title of new Bulletin TR-548. The bulletin is a reprint of an article and deals with separate phases of ferrous metal corrosion in the refinery field. **Write or call: Tubular Products Div., Babcock & Wilcox Co., Beaver Falls, Pa., for Bulletin TR-548.**

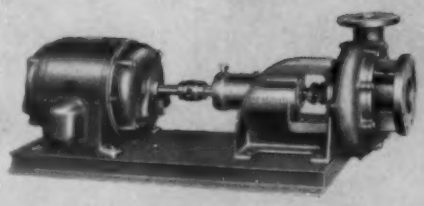
●

**Tray-type Deaerators** for effective removal of corrosive gases from boiler-feed water are described in new Bulletin 28B8853. Available in sizes with an effluent capacity from 18,000 to more than 2,000,000 lb. per hour, the deaerator is constructed by welding on plate thickness calculated on a 30-psig. ASME basis minimum plus ⅛-in. corrosion allowance. Stainless steel is used on all equipment exposed to corrosive gases and easy access for periodic inspection is provided by a generously sized access door and adequate manholes, the maker says. The bulletin includes a description of the cycle of operation of the tray deaerator, six typical storage arrangements, and a table of standard tray-deaerator data. **Write or call: Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., for Bulletin 28B8853.**

●

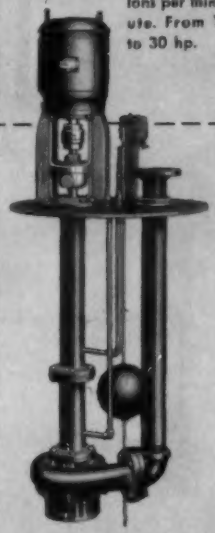
**Filter-Separator Bulletin** on a 15-g.p.m. unit is now available. The bulletin includes a check list of 49 liquids which can be continuously cleaned by the unit. These include diesel fuels, solvents, refinery-control stocks, gasolines, lube oils, boiler feed water, process intermediates, and industrial water. Drawings show installation and dimensional data, attachments, and external details. Ex-


PUMPS FOR EVERY INDUSTRY



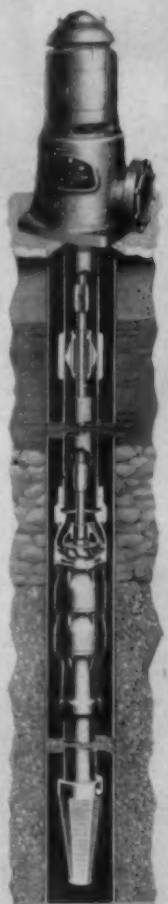
END-SUCTION CENTRIFUGAL PUMPS . . . two ball bearing type. Semi-open non-clogging impeller. Separate liquid end in standard iron or corrosion-resistant material. Optional features adapt to many requirements. Bulletin 4011.

"MOTOR MOUNT" CENTRIFUGAL PUMPS . . . pumps range from 1½" to 5" discharge . . . capacities to 1200 gallons per minute. From 1 to 30 hp.



VERTICAL SUMP PUMPS . . . single and duplex units, designed for wet pit service. Efficient, dependable with the latest construction and design features.

MULTI-STAGE HIGH PRESSURE VERTICAL CENTRIFUGAL PUMPS . . . designed for general industrial use. Handles liquids which are non-corrosive to iron and bronze. Ideal for boiler feed service.



VERTICAL TURBINE PUMPS . . . for wells 4 to 16 inches I.D. Capacities 15 to more than 3500 G.P.M. Bulletin No. 4700.

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Please send me a copy of your Industrial Pump Bulletin 1-57-E describing pumps for every industry.

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Company _____

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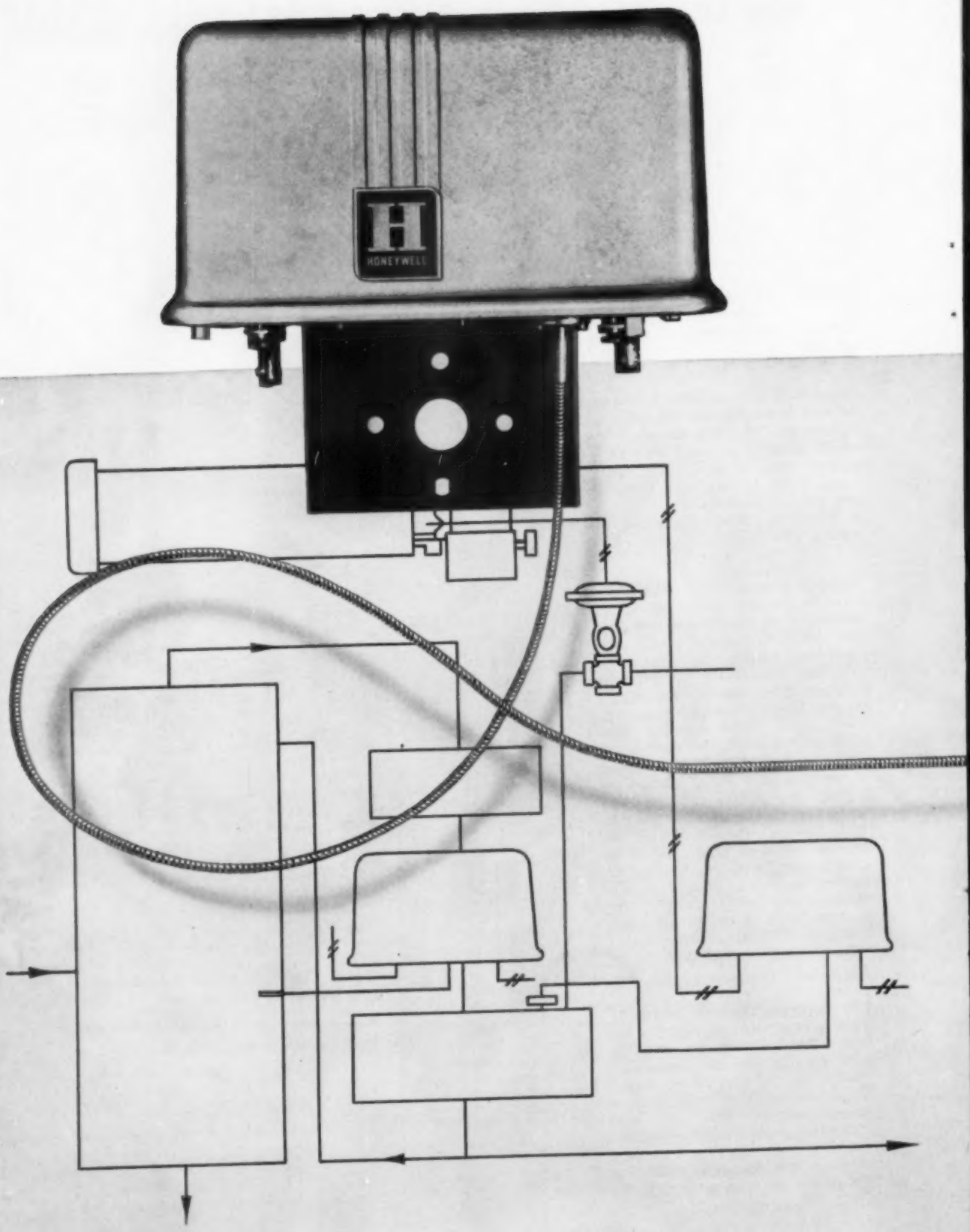
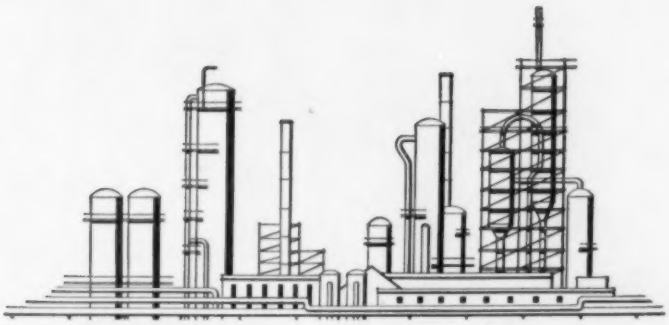
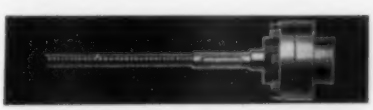

HONEYWELL



# One basic TEL-O-SET transmitter serves all applications

**TEMPERATURE SENSING ELEMENT** has small bulb for fast response. Either plain or coiled bulbs are standard, with or without union connections. For food processing applications, bulb is available with union connection for Type 3A4 sanitary fitting.



**PRESSURE SENSING ELEMENT**—a sealed volumetric pressure unit with stainless steel diaphragm and flange protects the transmitter from corrosive material, and damps line pulsations.

- Measures temperature, gage pressure or absolute pressure.
- Requires only one thermal system and one pressure system for all ranges. Changeover from temperature to pressure measurement is extremely simple.
- Span can be shifted to cover any part of the overall transmitter range—from 40 to 600 psi, or from –375 to 1000°F—*without changing or adding parts.*
- Equally accurate at small spans of 20 psi and 50°F or at wide spans of 150 psi and 400°F.
- High-speed response to temperature or pressure changes permits control within close tolerances.
- Ambient temperature and pressure compensated. Vibration resistant.

Get complete details on *Tel-O-Set* transmitters . . . and related *Tel-O-Set* miniature indicators, recorders and controllers . . . from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Products Group*, Brown Instruments, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:**
**Write for Specification S1003-1**

**Honeywell**

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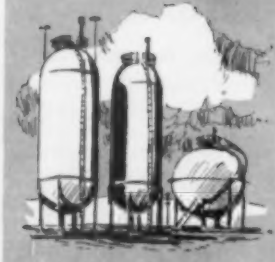
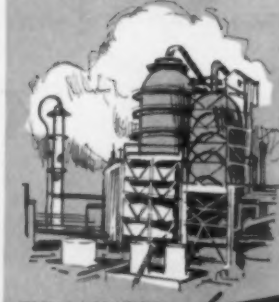
PRODUCTION LOANS



DEVELOPMENT LOANS



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ploded views illustrate the construction of the filter-and-separator cartridge and its replacement sequence. Also covered are specifications, construction features, installation advice, effectiveness tests, and a synopsis of the theory of operation of the unit. An auxiliary table presents specifications on eight larger models. **Write or call: Richmond Engineering Co., Seventh and Hospital Streets, Richmond, Va., for Reco Filter-Separator bulletin.**

●

**Seal Hangers for Floating-Roof Tanks** are outlined in new illustrated Catalog 158. The Nooter-designed two-point-suspension seal hangar is fully described. How it works, installation information, its effectiveness as a seal, and why it assures minimum maintenance are explained in this new brochure. The three popular types of floating-roof tanks—double-deck, pontoon, and pan—are illustrated. The brochure also describes the firm's replacement service showing that any existing roof can be up-dated through the installation of the Nooter seal, the maker says. **Write or call: Nooter Corp., 1400 South Second Street, St. Louis, for Catalog 158.**

●

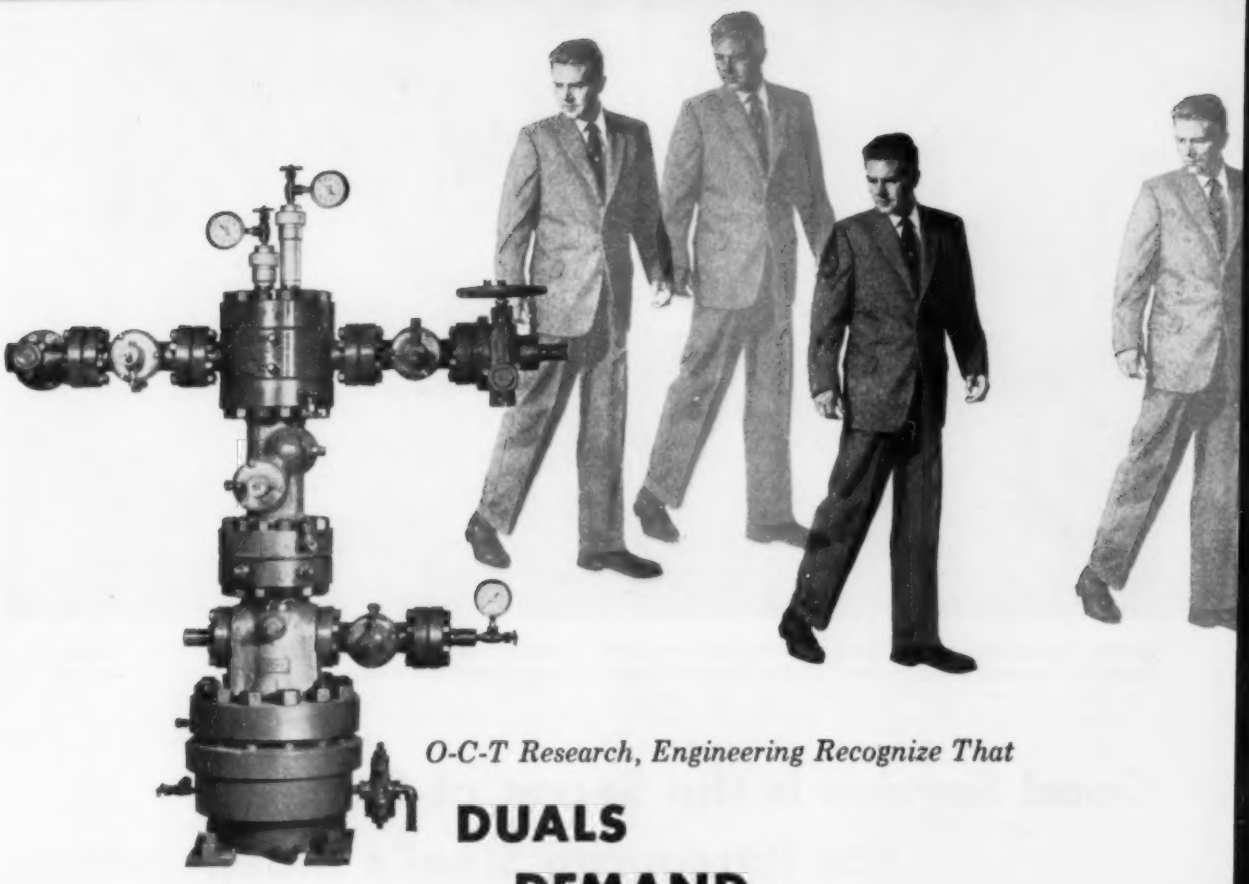
**Cast-Steel Gate Valves,** 150-lb. and 300-lb., are described in a new four-page illustrated bulletin. It provides dimension and weight charts and line drawings for each type. The two-color bulletin demonstrates such valve features as deep-stuffing boxes designed to assure tightness and long packing life, and gland eye bolts mounted to swing aside to ease packing maintenance. **Write or call: Walworth Co., 60 East Forty-second Street, New York City, for cast-steel gate-valves bulletin.**

●

**Underground Hot-Pipe Insulation** is described in new 12-page Brochure Z-1. The bulletin contains sequence photographs and diagrammatic drawings of Z-Crete, a cast-in-place, monolithic conduit system. Features cited are efficient insulation, substantial structural pipe support, high mechanical and load-bearing capabilities, and extreme resistance to water penetration. **Write or call: Z-Crete Div., Zonolite Co., 115 South LaSalle Street, Chicago 3, for Brochure Z-1.**

●

**Welded Steel Pipe for Industrial Uses** is discussed in new eight-page Bulletin SWP-14457. Diameters of the pipe range from 6 to 36 in. Wall thicknesses range from 9/64 to ½ in. Ap-



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# DUALS DEMAND DISCRETION

## *That's Why the Better Operators Pick O-C-T Dual Completion Trees*

Well control equipment isn't picked by the flip of a coin—and certainly not dual completion equipment. Dual flows can pose problems . . . but not when the installation bears the Oil Center Tool Company brand.

O-C-T offers precision dual wellhead units for multiple completions whether they be shallow depth, medium or ultra deep . . . whether they be low pressure or high pressure wells.

O-C-T dual assemblies feature, depending on the need:

- The Universal Tubing Head. This head is available with a complete range of interchangeable tubing hangers for both dual and single completions.
- The "UA" Attachment. This adapter converts any A.P.I. Tubing Head to a Universal Head.
- The Delta Flange. This flange gives the greatest strength and balanced load distribution in a dual string completion using individual master valves.
- Versatility. This means O-C-T assemblies can be converted over easily to dual hookups even when multiple completions were not anticipated.

O-C-T long has been a leader in development of fine dual completion trees. O-C-T will continue to be.

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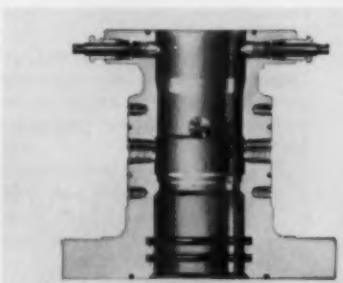
Export Representatives: South America — East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

*An example of the versatility found in O-C-T hookups is the Universal Tubing Head which is available with a complete range of interchangeable tubing hangers for both dual and single strings. Last minute changes in completions can be made without changing tubing heads or using special attachments. If only one producing sand is found in a projected dual well, the well may be completed by using a single string hanger. On the other hand, if a single completion is anticipated and two zones found, the well may be completed with a dual hanger.*



**In the Field**—Salesman "Riney" Rinehart (right) gains firsthand knowledge of drilling. Driller Earnest Mann points out excellent wear received from Pittsburgh Drill Pipe and Tool Joints. "Riney's" field work means . . .

# Good Service Is the Secret of Success for Pittsburgh Steel's Independents

Back in Indiana some 58 years ago, his parents named him Wallace Chester Rinehart. Since then, 35 years in Oklahoma and Texas oil fields have trimmed his name to just "Riney."

That's how he's known to thousands of oilmen in the fields of North Central Texas where he manages one of the largest independent oil field supply stores.

**A Texan for nearly 30 years, Riney has spent the last 14 as store manager of a Pittsburgh Steel Company independent distributor.**

He knows oilmen, their needs and the merits of the products he sells. Proof of this is found on a plaque displayed in his office. It cites Riney for "outstanding service" to the supply end of the oil business.

Being with Riney any length of time quickly convinces one that these words from the plaque—"outstanding service"—are really his key to success.

**More than for Riney alone, these words also sum up the reasons behind success of the entire 65-member organization he is with.**

For, if other companies started on a shoestring, Riney's outfit started on half a shoestring. Its first store was a two-story frame building that once had been a freight station and then a grocery warehouse. Rent was $25 a month, but leasing part of the space to a local taxi firm brought in $15 of this.

• **String-At-A-Time**—To hold inventories in line with cash on hand, pipe was bought a string at a time. And since the office adjoined the railroad yards, Riney's bosses could look out their windows to spot car numbers on incoming freight trains. When numbers matched their shipping notices, they hustled out and sold the shipment, even before it had to be unloaded. That produced enough money for the next string.

As precarious as it was, this system worked so well that within 2 years after the store's opening, it was able to order its first solid trainload of Pittsburgh Seamless. That was in 1935. And it has been handling Pittsburgh oil country goods ever since.

When nearby KAMAY field opened, 48 of the first 50 strings sold there were from Riney's company. Stressing service and quality products, the company has grown steadily since then. Sales now are expressed in millions of dollars a year. Seven stores handle upwards of 1500 customers.

**By keeping emphasis on its first main product—pipe—Riney's company achieves a rapid turnover on what amounts to half its inventory.**

Riney agrees with principals of his company when they set down this list of advantages offered by the independent distributors shown at right:

1. An independent's stores are the first in a field and the last to leave. Proof: Riney's company still maintains a KAMAY store, even though the field is completely developed.

2. The independent is a local businessman. His success in any one community depends on his reputation for service and quality.

3. The independent knows the field he's serving. For example, Riney stresses the importance in his area of the good quality, metallurgically controlled resistance to corrosion material provided by Pittsburgh Seamless.

4. Independents support the community where they live and work. Several principals in Riney's company hold important volunteer civic jobs.

5. Business decisions requiring detailed understanding of specific prob-

**In the Store**—"Riney," manager of one of the largest independent inland supply stores, knows what products will be needed by customers. As an independent, he is free to stock only the best products, such as Pittsburgh Seamless. The best in products and service is offered. . .

**Even on Street Corner,** "Riney" gives service. Here he checks maps of a new drilling location with drilling contractors Charles E. Morrison and Jack Grace. "Riney's" company has been handling Pittsburgh Seamless oil country goods since 1935.

lems are made quickly. A commercial decision in Riney's company takes only the time required to walk 50 feet from sales counter to the president's office.

6. Versatility. Riney offers for sale an inventory his company feels is the largest of any inland store. "Our customers know we have the part they need and this keeps costly drilling delays at absolute minimum," he says.

7. Location. Being in the heart of the producing area where oilmen transact their business, Riney gives maximum service.

Riney sums it up this way:

"Pittsburgh Steel helped us grow in the supply business by shipping us pipe that meets API specifications more consistently than that of most other producers.

**"The pipe we need around these parts has to be rugged. Pittsburgh's tubing, especially with that (blackening) coating is as good as any made. We don't have any trouble with the Pittsburgh Seamless Casing we sell due to the high quality materials we receive. And the drill pipe holds up as well, if not better than any, especially under the severe stresses to which it is applied.**

Riney and the independent he works for are typical of the more than 140 stores handling Pittsburgh Seamless. They specialize in service, help keep drilling costs low. An independent's prices are in line because his livelihood depends on meeting competition. He offers only the best in equipment because he is free to buy only what he wants to buy. And equipment manufacturers back up their independent distributors.

Riney's company is typical of the distributors listed on the right. So, next time you buy drill pipe, casing or tubing, use the combination that can't be beat—independent distributors—handling Pittsburgh Seamless.

## Distributor Home Offices

**Bradford Supply Company**
130 Main Street
Bradford, Pennsylvania

**Buckeye Supply Company**
18 Harrison Street
Zanesville, Ohio

**C. W. Cotton Supply Company**
Utica National Bank Building
Tulsa 5, Oklahoma

**Franklin Supply Company**
624 South Michigan Avenue
Chicago 5, Illinois

**Houston Oil Field Material Co.**
1524 Maury Street
Houston, Texas

**Industrial Supply Company**
500 Eighth Street
Wichita Falls, Texas

**Iverson Supply Company**
400 West Fifth Street
Tulsa, Oklahoma

**Lucey Export Corporation**
233 Broadway
New York 7, New York

**Lucey Products Corporation**
624 South Cheyenne
Tulsa 19, Oklahoma

**McJunkin Corporation**
P. O. Box 513
Charleston 22, West Virginia

**Midland Supply Company**
Box 3106
Washington St. Station
Wichita 7, Kansas

**Mountain Iron & Supply Co.**
100 Rule Building
Wichita 2, Kansas

**Murray Brooks, Incorporated**
P. O. Box 855
Lake Charles, Louisiana

**The Producers Supply & Tool Co.**
706 Commercial Standard Bldg.
Fort Worth 2, Texas

**Rodman Supply Company**
P. O. Box 591
Odessa, Texas

**Southwest Supply Company**
1720 Oliver Building
Pittsburgh, Pennsylvania

**Superior Iron Works & Supply Co.**
P. O. Box 1800
Shreveport, Louisiana

**Western Supply Company**
424 North Boulder Avenue
Tulsa 1, Oklahoma

# Pittsburgh Steel Company

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**District Sales Offices**

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|---|---|---|---|---|
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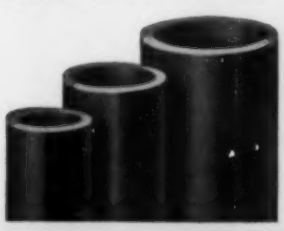
| Chicago | Dallas | Detroit | New York | Tulsa |
| | | Houston | Philadelphia | Warren, Ohio |



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Strong plastic construction that tops all Government safety standards, insulates against heat and sun and withstands over 10,000 volts.

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plications covered include process and water-supply piping. The bulletin includes data on pressure design, dimensions, and properties. Other sections cover welded pipe fittings for flanged pipe joints and slip-on type of flanges. Complete information is given on how to order pipe. **Write or call: Armco Drainage & Metal Products, Inc., Middletown, Ohio, for Bulletin SWP-14457.**

●

**Hot-Process Softeners,** a new 24-page bulletin, deals with the conditions that make water treatment necessary. It covers reduction of silica, foaming and priming, and problems of protection against corrosion. The bulletin deals with the various types of hot-process equipment and provides a number of drawings showing the variations of sedimentation - tank designs. Automatic control is also discussed, as well as the addition of hot zeolite to the process. The booklet includes a list of chemical reactions frequently referred to in feedwater treatment. **Write or call: Cochrane Corp., Seventeenth Street below Allegheny Avenue, Philadelphia 32, for Hot Process Softeners bulletin.**

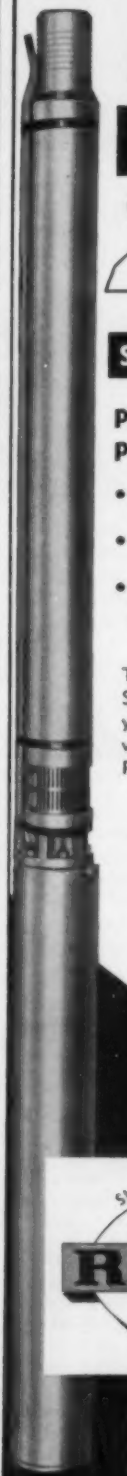
●

**Relative Humidity and Temperature Instrumentation** is reviewed in a new six-page catalog. Design and construction details are provided for a line of humidity indicators, recorders, and controllers. Indicating hygrometers described include both portable and utility models which provide a wide range of applications. Equipment for local determination of remote humidity conditions is detailed. This equipment uses a piping system to receive atmospheric samples and a temperature-compensating system to assure accuracy. Ruggedized indoor-outdoor recording instrumentation for humidity or humidity-temperature is included. **Write or call: Serdex, Inc., 12 Bowdoin Square, Boston 14, for Relative Humidity and Temperature Instrumentation catalog.**

●

**New Expanded-Metal Bulletin 20-4** illustrates use of the product in plant construction, maintenance, and manufactured articles, along with sizes, airflow tables, and load capacities. Four new patterns, supplementing the diamond-shaped opening, are shown for the first time. Expanded metal is supplied in carbon steel, stainless steel, and aluminum in standard and flattened mesh, the bulletin points out. **Write or call: Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, for Technical Bulletin 20-4.**

The NEW REDA "450" SERIES PUMPS
provide more oil per dollar invested
• 250-600 B.P.D.
• 900-4,400 Ft. Lift
• For 5½" or larger Casing Sizes



The new REDA "450" Series Pumps will REDUCE your lifting costs, and provide ECONOMICAL, DEPENDABLE performance.

• LOW INITIAL COST
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• LOW OPERATING COST
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• CORROSION-RESISTANT CONSTRUCTION

WRITE TODAY FOR REDA R-450 BULLETIN!

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PUMP COMPANY
BARTLESVILLE, OKLAHOMA
Manufacturers of Submergible, Electric Motors and Pumps for Over 35 Years.

Claymont's 160-inch plate mill in action. Fully integrated steel producing facilities and a complete range of fabricating equipment make Claymont a reliable source of quality steel plate and plate products for industry.

*Photo by d'Arazien*

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*Now one unit does two jobs*

# The New Cenco® AUTOMATIC TITRATOR measures both mercaptans and olefins

Just by a change of electrodes and the flick of a switch, this one versatile instrument can measure both mercaptans and olefins . . . rapidly . . . accurately . . . and automatically. It's amazingly simple to operate—capable of titrating a wide range of concentrations without the use of standard solutions. And from 15 to 20 consecutive analyses can be run without an instrument adjustment. Reaction time registers in tenths of seconds directly on the Titrator.

Here's a dependable instrument, designed to economically increase efficiency in your laboratory operation. The unit is enclosed in a sturdy, compact metal case . . . finished in blue gray hammertone. The overall dimensions are 12″ x 12″ x 4½″.

The Cenco Automatic Titrator has been licensed under patent rights of the Standard Oil Company (Indiana).

No. 20928-1 Cenco Automatic Titrator, with electrodes for mercaptans—$595.00

No. 20928-2 Cenco Automatic Titrator with electrodes for olefins—$625.00

The combination instrument with both sets of electrodes, $675.00

For more information, write for circular No. 1264A.

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## Sales Personnel Added to W. C. Norris Staff . .

to give the firm expanded representation in the oil country, according to Paul Hagaman, sales manager.

Homer Hill is now located at Ardmore, Okla.; Jack Connell, at Houston; Barron Preslar succeeds Jack Getty at Shreveport upon Getty's advance to the Tulsa office; George White, Hobbs, N. M.; and Earl Carpenter, northern Oklahoma and Kansas.

W. C. Norris, Manufacturer, is a division of Dover Corp.

## Mid-Continent Announces Promotions, Transfers . .

as part of the firm's expansion program. Named as the new district manager at Wichita, Kans., is W. B. Nance, former city salesman at Midland, Tex. Assuming new duties as store manager at Mid-Continent Supply Co.'s store at Drayton Valley, Alta., Canada, is J. L. Kenny. R. C. Walters has been appointed store manager at Shreveport, La.

W. B. NANCE

Other personnel changes include the promotion of J. E. Goodwin from district machinery salesman at Casper, Wyo., to division machinery salesman at Denver.

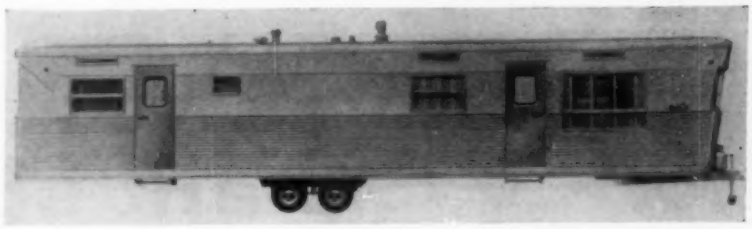
Assuming new duties recently as field salesmen were B. W. Griggs, Odessa, Tex.; Jack Howarth, Red Deer, Alta.; H. G. Molloy, Houma, La.; B. J. Perrin, Farmington, N. M.; and B. G. Swaringen, Brownfield, Tex.

## National Supply Co. Opens Store at Charlson . .

to serve the North Dakota counties of McKenzie, Dunn, Mercer and Oliver.

As a convenience to oil operators, National Supply has maintained a branch of its Williston store in Charlson since December 1956. As a further convenience, the Williston and Charlson stores are equipped for complete radio coverage of northwestern North Dakota.

William S. Dagg is the manager at Charlson. The store is under the supervision of J. D. McClintick, district manager of the Montana district.



## Spartan Equipment to Be Used in Turkish Project . .

**by Keir & Cawder Arrow Drilling (U. K.), Ltd. The drilling operations being launched about 100 miles west of Istanbul are being conducted for N. V. De Bataafsche Petroleum Maatschappij (Shell). Most of the 20 industrial units from Spartan Aircraft Co., Tulsa, have been shipped and will arrive ahead of drilling equipment and crews.**

**The first drilling rig slated for this project is now being checked out in Houston. Its equipment will include a Lee C. Moore 142-ft. mast and National 80-B drawworks.**

**A complete village will be set up close to the scene of drilling operations with complete living accommodations for all personnel and field office facilities.**

## J & L Supply Reorganizes Field Sales Management

According to Rainey Elliott, president of Jones & Laughlin Supply Division, all district sales managers and city sales managers have been reporting directly to Tulsa to A. G. Bastian, manager—field sales division; R. J. Woods, Jr., director of sales; and W. L. Wolfe, vice president—sales. Three new regions have been formed recently which include 19 of the company's 25 district and city sales offices and 42 of the company's 85 stores.

D. T. OTTINGER

F. L. McFARLAND

D. H. CARSON

The appointment of three regional managers and five new district managers was simultaneously announced. D. T. Ottinger, formerly district sales manager of the South Texas district, has been appointed regional manager of the Gulf Coast with headquarters at Houston. Under his supervision will be C. E. Rogers, manager of the southern Louisiana district, New Orleans; L. P. Mackey, newly appointed manager of the South Texas district, San Antonio.

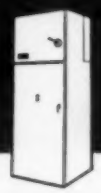
F. L. McFarland, formerly district

## New O-C-T Warehouse Services South Louisiana . .

**and makes it possible to stock complete lines of christmas trees and well head parts. Assembly, testing and renovation services are also incorporated in this new warehouse recently put into operation by Oil Center Tool Co. three miles east of Lafayette. In addition to the 50 by 100-ft. warehouse, the structure includes an office building.**

**The new facilities are the district headquarters for South Louisiana. District manager is D. L. Tanner. Sales representatives are Gil Lastrapes and Charles Linscomb. Warehouseman is Bob Chachere.**

## Newly designed
## Type H Motor Control



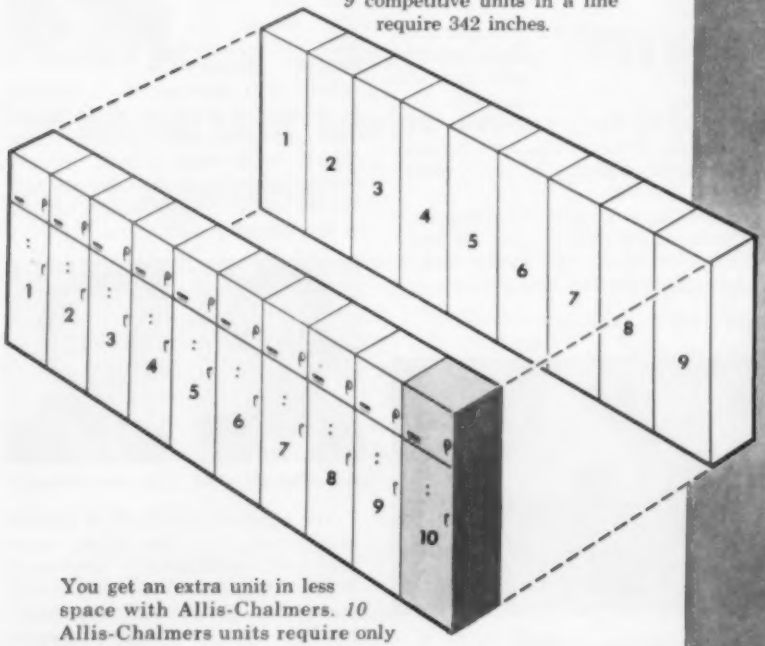
# Saves valuable plant space

Newly designed Allis-Chalmers high voltage control units are only 34 inches wide. This means you can put 10 Allis-Chalmers cabinets in less space than required by 9 competitive 38-inch units. In addition, the narrower width means less space required for door swing. Result: You save a total of 2.36 sq ft of floor space per unit. On 10 units, this means a saving of 23.6 sq ft.

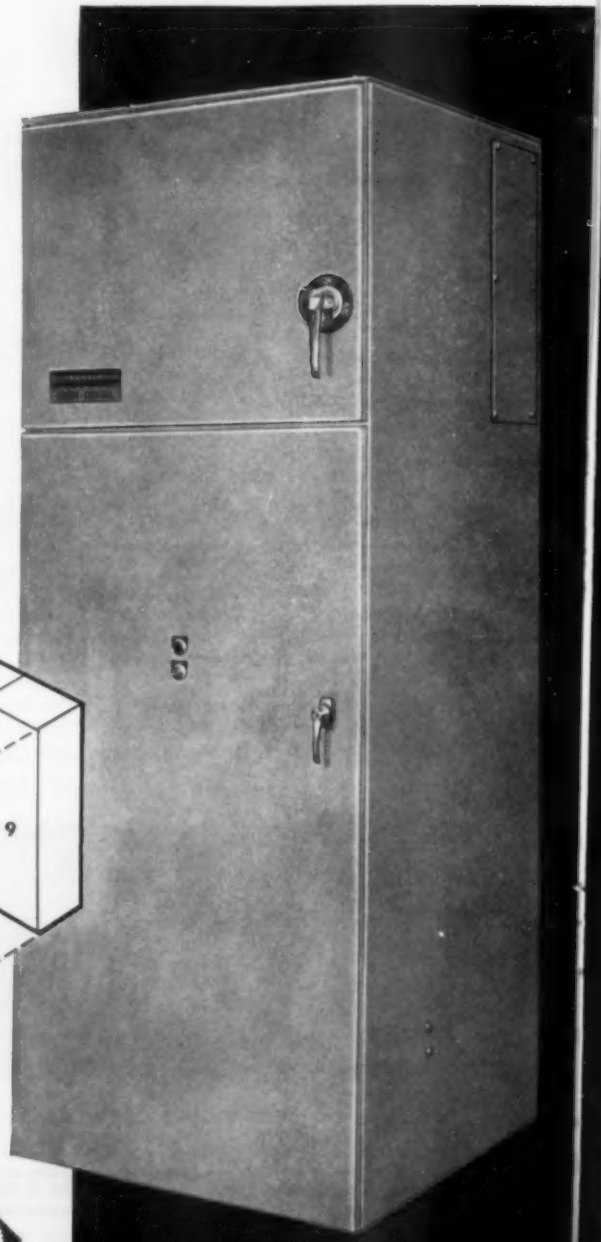
Smaller size is only one of many advantages in this new Allis-Chalmers design. You also get full-front access, more room for optional features, a completely tested unit, and the ultimate in protection for men and machines.

For more information on how this new control design can help you, call your nearest Allis-Chalmers representative, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

*9* competitive units in a line require 342 inches.




You get an extra unit in less space with Allis-Chalmers. *10* Allis-Chalmers units require only 340 inches.



**ALLIS-CHALMERS**

A-5518

manager, West Texas, was appointed regional manager for the Southwest region with headquarters at Midland, Tex. This region is made up of the West Texas-New Mexico district, headquartered at Odessa, Tex., for which Glenn A. Whiteker is newly appointed manager; the Central Texas district, Abilene, H. H. Ray, newly appointed manager; and the present Panhandle district headquartered at Amarillo, H. U. Everett, manager.

D. H. Carson was named regional manager of the Rocky Mountains with headquarters at Denver. Under this region will be the North Rocky Mountain district, headquartered at Billings, Mont., M. A. Park, manager; Central Rocky Mountain district, Casper, Wyo., G. E. Best, newly appointed manager; South Rocky Mountain district, Farmington, N. M., J. W. Johnson, newly appointed manager.

## McWilliams Made President Of Republic Supply . .

McWILLIAMS

following the resignation of Dean A. McGee as chairman of the board of directors and the election of James E. Webb to that post. W. J. McWilliams, formerly vice president for operations, takes the position formerly held by Webb.

In 1954 McWilliams was appointed corporate secretary and assistant to the president of Republic Supply Co. He was elected vice president (operations) in 1956.

## Ideco Appointed Graver Export Sales Agent . .

for the oil and gas equipment division of Graver Tank & Manufacturing Co., Inc. The appointment was made jointly by George W. Walton, president of Ideco, and J. E. Fogarty, vice president and general manager of Graver's Mid-Continent division.

Ideco, Inc., has agents, affiliates and service representatives in active oil areas throughout the world. Dresser, A. G., and Dresser International, Inc., are sales representatives for Ideco in the Eastern Hemisphere and Western Hemisphere, respectively.

Manufacture of the Graver line of oil field equipment is centered in its Sand Springs, Okla., plant. No change will be made in the distribution of Graver's products in the United States, which will be handled by the company's own sales and service facilities.

## FWD Sells Interest to Paradynamics, Inc., . .

MALLINCKRODT

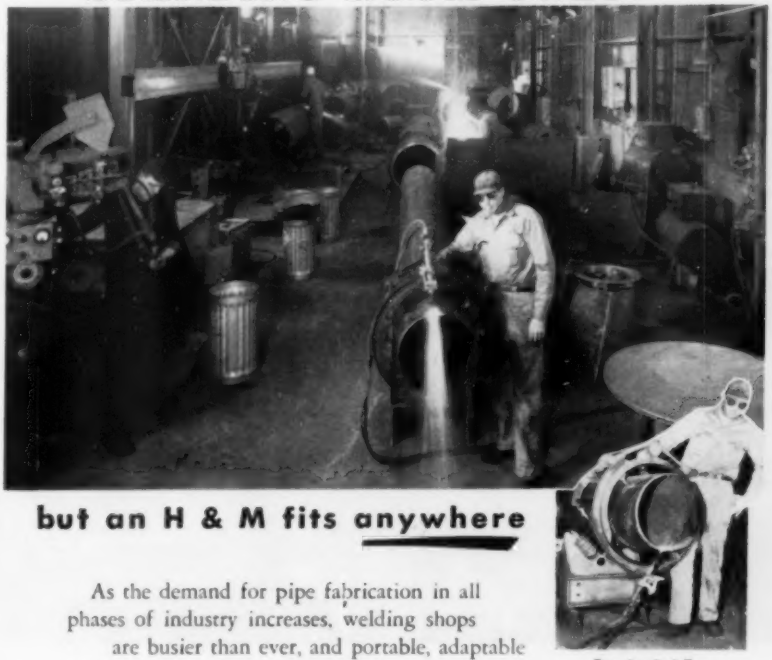
research and development corporation of St. Louis, Mo., according to Franklin Lyons, chairman of the FWD board of directors. Paradynamics has purchased 151,000 of Four Wheel Drive Auto Co.'s 300,000 outstanding shares.

Lyons and five FWD directors resigned after completion of the sale. George E. Mallinckrodt, president of Paradynamics, was elected chairman of the new FWD board, with Lyons continuing as a director.

Newly elected FWD directors with Mallinckrodt were Maurice E. Ash, vice president, Paradynamics; Albert W. Merck, director, Paradynamics; Arthur Young, scientist who played a major role in perfection of helicopters; and William Van N. Washburn, vice president of a Boston, Mass., advertising concern.

Remaining directors are Lyons; Robert A. Olen, FWD president;


STANDING ROOM ONLY!



but an H & M fits anywhere



Pat. Applied For

As the demand for pipe fabrication in all phases of industry increases, welding shops are busier than ever, and portable, adaptable equipment like H & M Pipe Cutting and Beveling Machines, are becoming more important every day.

H & M machines — for pipe of 1½" to 36" in diameter — deliver speed, accuracy, durability and economy, even in the hands of inexperienced operators. Yet, they are easily moved from job to job, or shop to field, and can be stored away conveniently in their own specially-designed boxes.

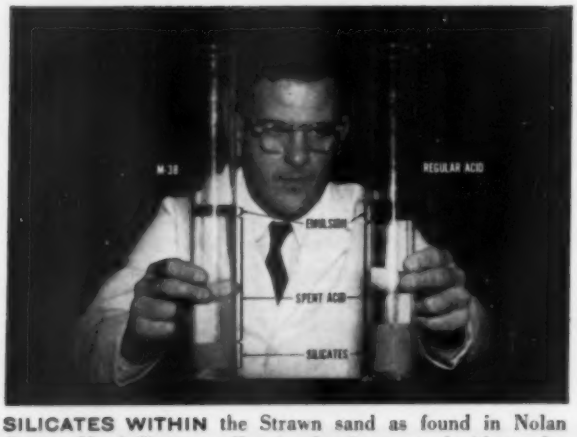
Investigate H & M Pipe Cutting and Beveling Machines today — write for complete details.

Important H & M Accessories:

THE OUT-OF-ROUND SHAPE CUTTER FLEXIBLE SHAFT
MOTORIZED UNITS BOXES AND DOLLIES HOOKS, CLAMPS

H&M TM REG.
PIPE BEVELING MACHINE COMPANY
311 E. Third St. Diamond 3-0241
TULSA, OKLAHOMA

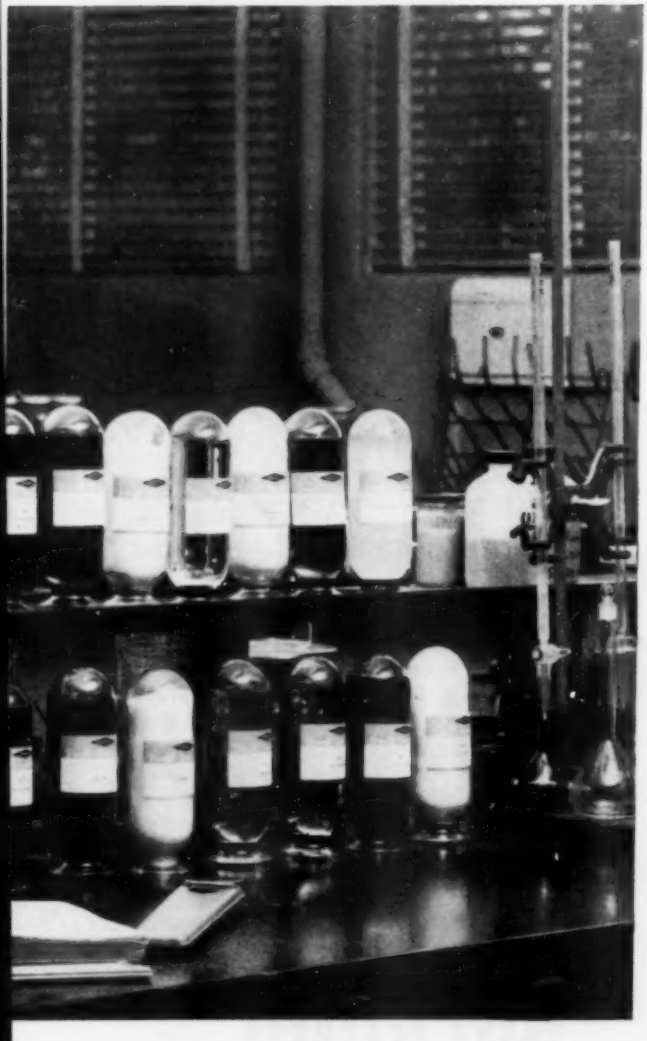
# DOWELL'S 41 ACID ADDITION

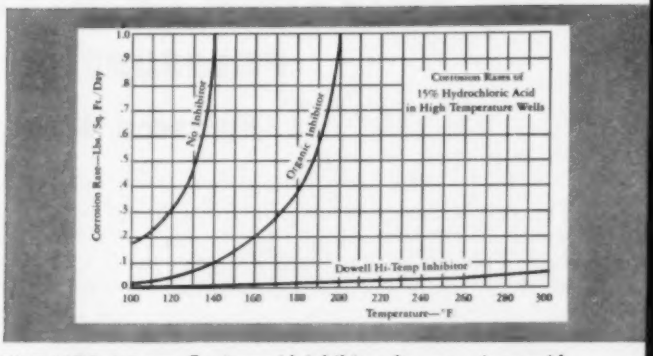



**SILICATES WITHIN** the Strawn sand as found in Nolan County, North Texas, swell seriously when treated with regular inhibited hydrochloric acid. This frequently restricts production. When Dowell M-38 additive is blended with the acid, silicate swelling is avoided, as shown here. Good production increases are the rule in this area when Dowell tailors the acid treatment with M-38.

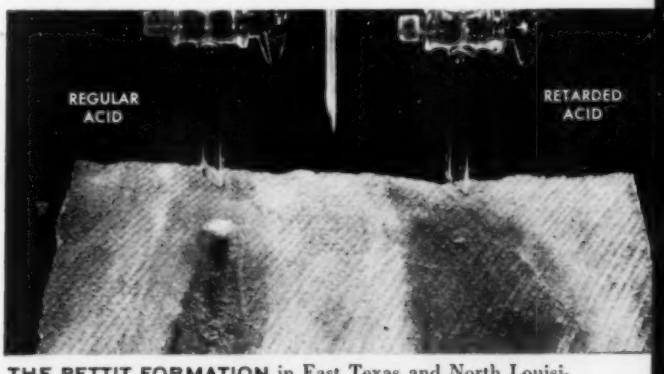
**MUD ACID OFFERS** different benefits to different producers. Along the Gulf Coast, operators order it for its excellent mud-removing qualities. In the Permian Basin, the Rockies, and Canada, it is valuable to spearhead fracturing, acidizing or cementing operations. It is also useful to acidize certain sand formations of low regular acid solubility. In *all* areas it helps improve the results of Dowell stimulation treatments.

# AGENTS GIVE YOU FASTER PAYOUT






**THE USE OF** an effective acid inhibitor for any given acid treatment is as important as the selection of the proper addition agent. For that reason Dowell research has developed a variety of inhibitors designed to provide maximum protection over a wide temperature range. Most famous of these is Dowell's high temperature inhibitor—proved effective in wells with bottom-hole temperatures up to 350° F.




**THE PETTIT FORMATION** in East Texas and North Louisiana is an oolitic limestone, and a good example of a formation that responds favorably to Dowell Retarded Acid. This photograph shows the slower reaction rate of Retarded Acid (right) as compared to that of regular inhibited acid. The retarded action often results in higher production and faster payout.

## DOWELL ENGINEERS USE THESE ADDITION AGENTS TO TAILOR ACID TREATMENTS TO THE REQUIREMENTS OF YOUR WELL

Each of the bottles shown here contains a chemical especially selected by Dowell to overcome certain formation peculiarities encountered in acidizing oil and gas wells.

Mere stores of chemicals mean little, however. They must be blended and used skillfully. Dowell engineers and chemists apply unparalleled experience in recommending these addition agents to speed up pay out and increase ultimate recovery from your wells.

Dowell scientists are not satisfied with a single agent for a purpose. Since well conditions vary, they have developed *families* of agents to do each job.

When faced with a problem well, Dowell chemical and petroleum engineers, aided by the most modern laboratory equipment, analyze the problem. If necessary, they employ an electronic IBM system to help identify well samples and select the right addition agents. This complex system, developed by The Dow Chemical Company, is continually added to and modified—to provide you fast, effective analytical service.

On these pages, you will find four examples of Dowell addition agents and how they work. For full information on "tailored" acidizing, call any of the 165 Dowell service points in the United States and Canada; in Venezuela, contact United Oilwell Service. Dowell Incorporated, Tulsa 1, Oklahoma.

*Services for the oil industry* DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

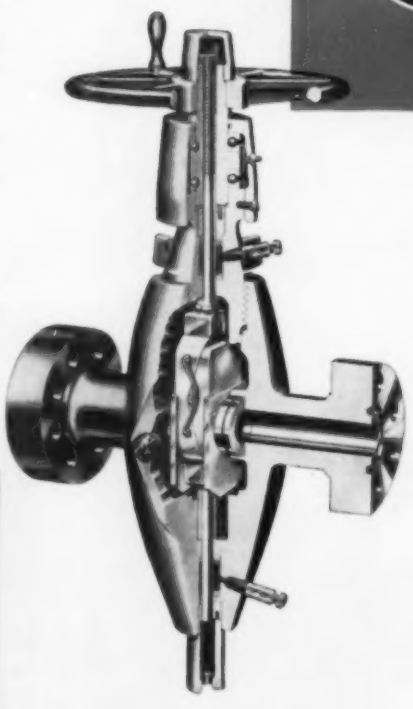
# EASY OPERATION UP TO 15,000 LBS. PRESSURE

## W-K-M *Balanced Stem* VALVE

The revolutionary W-K-M® Balanced Stem Gate Valve is the easiest to operate high-pressure valve ever made. Even under its full rated load of 15,000 lbs. the valve opens and closes freely.

The pressure in the valve body causes the balancing stem attached to the bottom of the gate to exert a force equal to, and in the opposite direction from the force exerted on the operating stem. The only force to be overcome is the gate drag which depends upon the pressure differential across the gate.

The W-K-M Balanced Stem Valve incorporates the same parallel expanding gate design as all W-K-M Gate Valves, thus providing a tight seal upstream and downstream plus all of the other advantages inherent in this outstanding design.



## OTHER IMPORTANT W-K-M VALVE FEATURES

- Can be fully repaired while on the tree.
- Bronze and steel stem threads located outside body, easily lubricated
- High Pressure Packing
- Superfinished Stems
- Two Ball Thrust Bearings

*When you need to control high pressures you will find you can do it best with W-K-M Balanced Stem Valves. Write Dept. A-210 for Bulletin WP 1157 for specifications and engineering data on the Balanced Stem Valve and for information on W-K-M Through-Conduit Gate Valves for oil field services ask for Catalog 200.*

W-K-M

DIVISION OF acf INDUSTRIES INCORPORATED

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W-K-M is a registered trademark of ACF Industries, Inc.

MANUFACTURERS OF W-K-M GATE VALVES ACF LUBRICATED PLUG VALVES KEY-KAST ALLOY STEEL PIPING FITTINGS KEY RETURN BENDS AND FITTINGS

5720

James A. Driessen, FWD executive vice president; and Max Stieg, Clintonville, Wis., banker.

## Dowell Makes E. A. Ernst District Engineer . .

to supervise engineering developments and activities in the Wichita Falls district which comprises about 50 counties in North, Central and West Texas. According to Jack Sutherlin, district manager, Ernst succeeds J. A. Harmon, now district engineer at New Orleans.

Ernst has served Dowell Incorporated as a junior service engineer at Ulysses, Kans.; service engineer at Graham, Tex.; station manager at Abilene, Tex.; and area manager at Oklahoma City. In 1956 he went to New Orleans as district engineer, the position he held prior to his recent appointment.

Dowell provides oil and gas-well chemical services in the Wichita Falls district from seven operating points at Wichita Falls, Gainesville, Graham, Vernon, Abilene, Colorado City and Rule, Tex.

## BJ Service, Inc., Opens Lake Charles Station . .

fully equipped to handle Gulf Coast cementing jobs. According to John B. Merritt, executive vice president, the pumping fleet is made up of 111-TB's, new trucks designed for high-pressure, high-volume operations. The bulk cement plant has four 3,600-cu.-ft. silos, and the warehouse stocks materials to assure immediate supplies of the correct mix for any job. The blender can handle up to 350 cu. ft. of materials at once.

The new station is under the direction of Gulf Coast district superintendent, R. P. Kirkpatrick, who headquarters at the new district office at Lafayette, La. Station manager at Lake Charles is W. W. Ryan, and sales engineer is Denis I. Mouton.

**R. P. Kirkpatrick (left), superintendent of the Gulf Coast district, and William W. Ryan, manager of BJ Service's new Lake Charles station.**

## Griscom-Russell Announces New Plant Facility . .

at its Massillon, Ohio, plant. The special service facility will serve other companies requiring a combination of special equipment and welding, brazing, assembling and quality control techniques for the fabrication of precision products.

The special facility's equipment, much of it designed and built by Griscom-Russell Co., is capable of manufacturing products that range in weight from several ounces to 60 tons. The facility has a complete machine shop with tube bending and forming equipment to produce helically coiled tubes of unlimited length having outside diameter of convolutions as small as 1¼ in. in difficult-to-work materials.

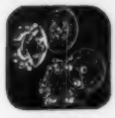
Quality control techniques include magnetic particle, ultrasonic, fluorescent, dye penetrant, radioactive source and X-ray inspection, as well as mass spectrometer and halogen leak detection.

The welding processes include tungsten inert gas, submerged inert gas cone arc, and resistance welding. A


ROCKFORD

LONG LIFE
Heavy-Duty
POWER
TAKE-
OFF

40,000 HOUR MAIN BEARINGS


Small Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

The Timken main bearings in this new ROCKFORD Oil Field type POWER TAKE-OFF are calculated on the basis of 40,000 hours (5-10 Bearing Factor). These bearings are of ample size and capacity to give good service for the life of the engine with which this take-off is used. Your equipment will benefit from the long-life factor of this ROCKFORD extra Heavy-Duty POWER TAKE-OFF.

SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER
1305 Eighteenth Ave., Rockford, Ill., U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

vertical pit furnace is capable of brazing constructions up to 20 ft. long.

## Republic Flow Meters Co. Names R. B. Drescher . .

assistant sales manager of this subsidiary of Rockwell Manufacturing Co.

Drescher was formerly Pittsburgh district manager. In addition to his duties, he will supervise the engineering of contracts placed with Republic. Drescher joined Republic in 1937 as a service engineer in the Chicago headquarters office.

## Catalysts & Chemicals, Inc., Names Englert . .

as sales manager, according to R. E. Reitmeier, president.

EARL ENGLERT

Earl Englert began his engineering career with the central research department of Monsanto Chemical Co. as an engineer in the chemical process development group. Since then he has held positions in plant operations, process plant engineering sales, and more recently he had held the position of manager of catalyst sales for Girdler Co.

## Ralph N. Brodie Co. Names Stentz Equipment Co. . .

to represent Brodie meters and allied equipment for production, pipeline, well head and refinery services in the Permian basin area of West Texas.

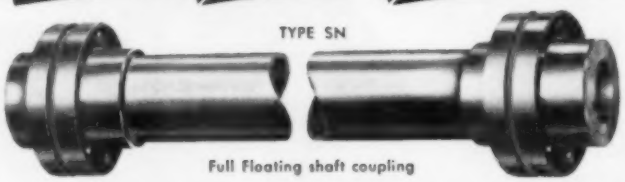
S. L. Stentz, president of the representative firm, has had many years of sales and application experience in production and pipeline fields. Stentz headquarters are in Midland and Odessa, Tex.


Protect Your Machinery with

THOMAS FLEXIBLE COUPLINGS

ALL METAL

NO LUBRICATION . NO MAINTENANCE . NO WEARING PARTS




Full Floating shaft coupling

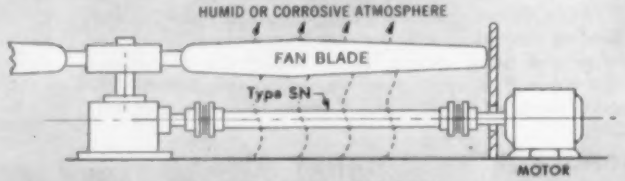
REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

Thomas Couplings are used to advantage on Pumps, Compressors, Cooling Towers, Rigs or any other tough job where continuous operation and dependability are required.

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance




COOLING TOWER INSTALLATION

In the typical cooling tower installation shown above, the motor — outside the humid or corrosive atmosphere — is connected by a floating-shaft coupling to the gear box under the large slow-speed, horizontal-blade fan.

Write for engineering catalog 51A, and the name of your nearest Thomas representative

THOMAS FLEXIBLE COUPLING COMPANY

WARREN, PENNSYLVANIA, U.S.A.


## Eastman Reorganizes Its Field Sales Activities . .

R. H. CANNON

of the chemical division into three regional areas. Appointed as regional sales managers are Robert H. Cannon, John H. Sanders and Decatur B. Campbell, Jr., it has been announced by Dr. J. E. Magoffin, vice president, and G. A. Kirton, sales manager. Eastman chemical Products, Inc., is a subsidiary of

J. H. SANDERS

D. B. CAMPBELL

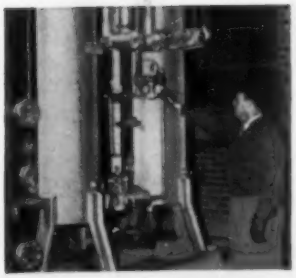
Eastman Kodak Co. and markets the products of two of Kodak's principal chemical manufacturing divisions, Tennessee Eastman Co. and Texas Eastman Co.

Cannon, who has been in charge of the chemical division's New York office, will direct the sales of chemicals and dyes in the New England and Middle Atlantic states. Sanders will manage those areas served by the Cleveland, Cincinnati and Greensboro, N. C., offices plus other areas of the South and Southeast. Sanders was formerly in charge of the Cleveland office and, more recently, product manager for all chemicals produced at Texas Eastman. Campbell will direct midwestern sales in those areas served by the Chicago, St. Louis and Houston offices. He formerly was in charge of the Chicago office.

*Some of the many available desiccants*

## It takes an expert prescription to dry gas properly . . .

# Come to Kemp



Kemp Model 300 S Dryer protects pneumatically operated instruments at Sun Oil's Marcus Hook Plant. This unit has operated continuously since installation with little or no attention, giving specified performance at all times.

Over 20 *different* desiccants . . . each with its own particular properties and uses. It takes experience to choose the right one and engineer it into a drying system that will exactly meet your needs.

Kemp offers you that experience . . . almost a quarter-century in designing and building drying apparatus. Kemp engineers combine the right equipment and the right desiccant into a unit that brings you dependability, ease of maintenance, and simplicity of operation. For any use . . . guarding pneumatically operated instruments and tools . . . drying process gasses and inerts for blanketing and purging . . . pressurizing anhydrous liquids . . . liquid drying or any of a host of other applications . . . a Kemp Oriad or Convection type dryer will give you high efficiency drying at low cost.

To improve performance and cut costs in your operation, have Kemp engineers recommend a system for your plant. Your Kemp Representative will give you detailed information, or write direct for Bulletin D-100. The C. M. Kemp Mfg. Co., 405 East Oliver St., Baltimore 2, Md.

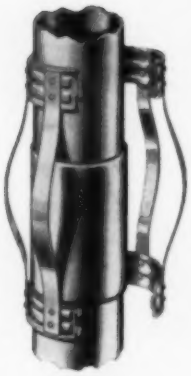
Kemp Convection Dryers

Kemp Inert Gas Generators

**KEMP**
**OF BALTIMORE**

Kemp Industrial Carburetors

Kemp Oriad Dryers



SHORT
LOK-ON
FIG. 904

SHORT
SLIP-ON
FIG. 902

# LARKIN CENTRALIZERS PUT YOUR PIPE ON TARGET

LONG
LOK-ON
FIG. 905

LONG
SLIP-ON
FIG. 903

The double-bow design of the Long Larkin Centralizer, in both the Slip-On and Lok-On Types, gives you the maximum in centralizer performance.

Based on established standards these centralizers

* **Take 45% less permanent set than maximum allowed Exert 300% more initial centering force than minimum required.**

**FIVE RANGES**

Each of the four different types of Larkin Centralizers come in five different ranges. Therefore, there is a Larkin Centralizer "tailor made" to give maximum performance in any casing/hole size combination. The "tailor made" feature also assures easy starting at all times.

The Short Larkin Slip-On and Lok-On Centralizers fill the requirements of efficiency and economy in shallower areas or on short strings in undeviated holes.

*Certified by an independent engineering firm which tested Larkin Centralizers after an extensive survey of Oil Company standards for centralizer performance.

**LARKIN PACKER COMPANY, INC.**
WAXAHACHIE, TEXAS

LARKIN
...Through Your Supply Store

PESA

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

# Wildcatters: Don't Pass Up Las Animas

By Frank J. Gardner
Exploration Editor

**LAS ANIMAS ARCH** oil and gas has now been found at the northern and southern ends of the huge uplift These flank successes may open new wildcat campaigns all along its 250-mile crest between now and 1965

PEERING THROUGH the gloom curtain that surrounds much of the industry today, oil finders see little to be discouraged about. Seldom, at any one time, have so many active hot spots in so many different provinces beckoned to the wildcatter. The Williston, Paradox, Green River, Powder River and Anadarko basins all share the spotlight today.

But often a smaller, less-heralded strike, whose impact is not immediately apparent, can hold real meaning, especially for the independent operator. Away from the spotlights, where acreage prices are climbing and headlines are flashing, these smaller finds occur every day.

**A new county . . .** Look, for instance, at Dundy County, Nebraska. It's a new oil county for the state. The discovery occurred in October 1957 when James M. Cline Oil Co. 1 Jones, Section 21-1n-37w, came in for 60 bbl. per day on the pump. Production came from the Lansing-Kansas City (Pennsylvanian) section at 4,175-87 ft. Current production at the discovery averages 4 bbl. per hour.

Today, Cline 1 Rickard, first offset to the Jones discovery, in Section 22-1n-37w, is testing for Lansing-Kansas City completion at 4,180-90 and 4,230-48 ft. Swabbing 4 to 7 bbl. per hour after acidization, this one promises to outdo the discovery well; earlier tests had recovered as much as 30 bbl. hourly. The oil tests 37° gravity. Meanwhile, a second operator, Mercury Petroleum Co., is perforating its 1 Rickard, in Section 22-1n-37w, ¼ mile southwest of Cline 1 Rickard. This third prospective producer for the new field will try for production at 4,236-46 ft.

**Should kindle a play . . .** These small producers do not make headlines, for it takes a positive indication of really "big oil" to do that. But they are often more important than we think at first. In the case of Dundy County, they are important because they are the forerunners of the really big play that lies in store for the Las Animas arch. This mighty arch, stretching across eastern Colorado, northwestern Kansas, and southwestern Nebraska, should hide as many oil and gas fields as the Central Kansas uplift, but its secret lies yet undisclosed. The Dundy County discovery should kindle as active a drilling play for the northern end of the arch as the discoveries in Bent and Kiowa counties, Colorado, have for the southern end.

When Continental Oil Co. found the first gas field on the arch in Kiowa County in 1952, little interest was aroused. But with the discovery of Bents Fort oil field in Bent County early in 1956, an active wildcat campaign was fired. Since then, half a dozen gas fields have been opened, and early in 1957, Continental completed a 240-bbl. oiler just southeast of the original 1952 gas well. Most active wildcatter in this southern arch country has been D. D. Harrington, who found two new gas pools (now combined with the original McClave field) in 1957 and now is finishing a new one at his 1-A Erramuspe, Section 34-20s-48w (arrowed on map).

These southern Las Animas fields produce from Pennsylvanian rocks, Morrowan to Marmaton in age, at depths of 4,000 to 5,000 ft. The northern arch discoveries in Dundy County, Nebraska, producing from the younger Lansing-Kansas City Pennsylvanian section, simply add luster to the prospects of what stratigraphic-trap prospects must lie all along the 250-mile crest of Las Animas.

**All along the arch . . .** As early as 1925, near the common corner of Kansas, Nebraska, and Colorado (see map), gas was produced from Niobrara-Cretaceous sands. Now abandoned, these small fields were the earliest signals that Las Animas was an oil and gas candidate. Today, 33 years later, the industry is beginning to read those and later signals. The true potential of the arch has not yet been tapped, and it may be years in coming. But not too many years. For an open lease along the arch is hard to find, and great numbers of them expire in 1965.

**Union Oil Co. of California takes another look at seismic and geologic records and decides that . . .**

# Mountain View field can pay

BY WILLIAM T. SMITH
District Editor

THE DECISION to make this re-examination of the Mountain View area in Kern County was made in the face of several significant failures by other major companies in similar ventures.

Seismic work offered some encouragement. Union put together a picture which indicated a faulted nose structure in 21-31s-19e, about 2½ miles west of Arvin and structurally downdip from the shallower portions of Mountain View field.

Union's initial effort in this activity was drilled in NW SE 21-31s-29e. The well, 55-X Stenderup, resulted in the Stenderup pool discovery at 9,535-9,717 ft. On the first test of that interval, it flowed at a 1,440-bbl.-daily rate. For completion, it was put on production flowing about 900 bbl. daily of 27.5°-gravity crude through a 33/64-in. choke. Total depth of this test was 12,514 ft. with a plugged back depth of 9,721 ft.

Since the Stenderup discovery, Union has drilled nine additional tests in Section 21. Six resulted in Stenderup producers, one resulted in a shallower zone pool discovery, and found the sand nonproductive and one failed to find the sand at all.

From the drilling done thus far, the structures appear to be closed on the southeast by a southwest - northeast trending fault and by sand pinchout on the north.

The reservoir rock is fine-to-coarse pebbly sand composed of several sand bodies with interbedded shale. Producing intervals vary from 9,659 ft. to 9,982 ft. The wells average about 100 ft. of sand, except the northernmost wells which have only 20 to 30 ft. No edgewater has been encountered yet.

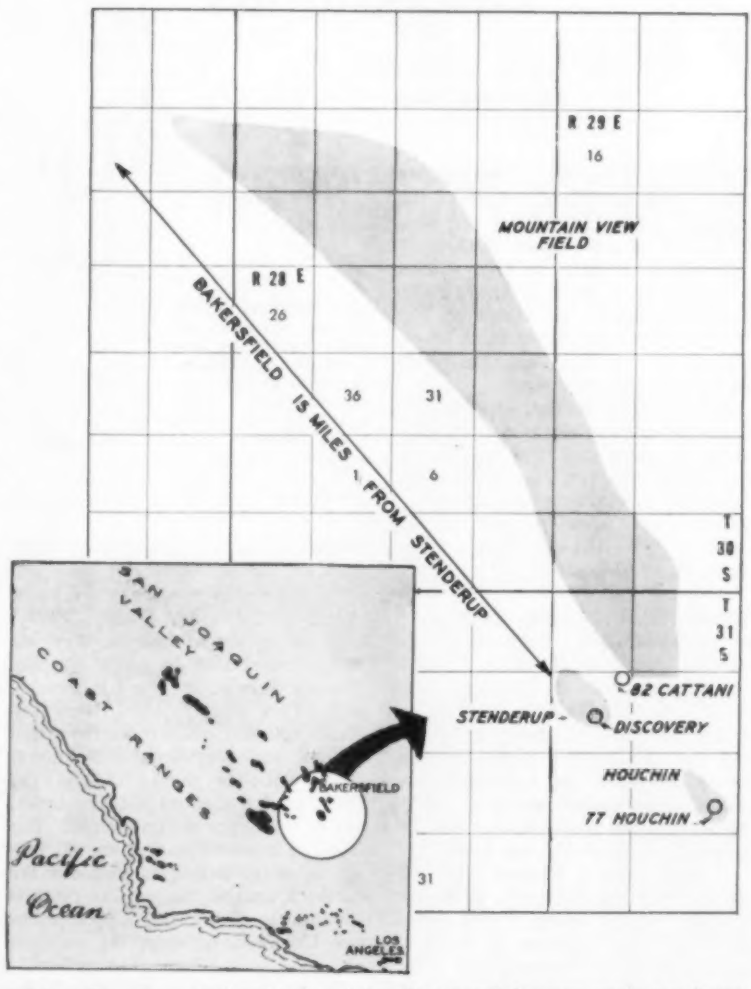
The sand is equivalent to the lower Stevens sand found in central San Joaquin Valley (upper Miocene).

Union went to 10,331 ft. with 64 Cattani, the most easterly producer in the pool. Some idea of the steeply dipping bed conditions can be gained by noting that the basement outcrops only 6 miles southeast of 64 Cattani.

Further development in the Stenderup pool will be in a west-southwest direction. The present areal extent of the pool is about 150 acres with an estimated reserve of more than 1,000,000 bbl. However, the pool has not been completely defined and the reserve estimate could be easily doubled.

Several months after the Stenderup discovery, Union moved about 1½ miles southeast with a wildcat in SE SE 27-31s-29e. This play again resulted from a reexamination of seismic records plus a study of known subsurface conditions similar to that which led to the Stenderup discovery.

Union hit again. Its 77 Union-Hancock - Houchin - Guimarra was completed as a new pool discovery mak-




**CALIFORNIA** is the site of an interesting search for new production being carried on along the west side of the 25-mile-long Mountain View field near Bakersfield. Specific targets are stratigraphic and fault traps in Stevens sand. Setting the pace so far is Union Oil Co. of California with three discoveries in little more than a year.

ing 164 bbl. daily on the pump of 35.1°-gravity crude from an interval at 8,095-8,224 ft. Union next moved 1,000 ft. northwest to drill 53-27 Houchin-Guimarra. It proved to be a big producer making 900 bbl. daily initially from the pool at 8,125-8,225 ft. Since then Union has completed one other well, a northwest offset to 53-27 Houchin-Guimarra and about 2,000 ft. northwest of the pool discovery well.

Union's most recent discovery in the area was made about 2,000 ft. northeast of the Stenderup pool's nearest producer in early November. The new pool is in the Santa Margarita sand at a depth about 2,000 ft. shallower than Stenderup wells.

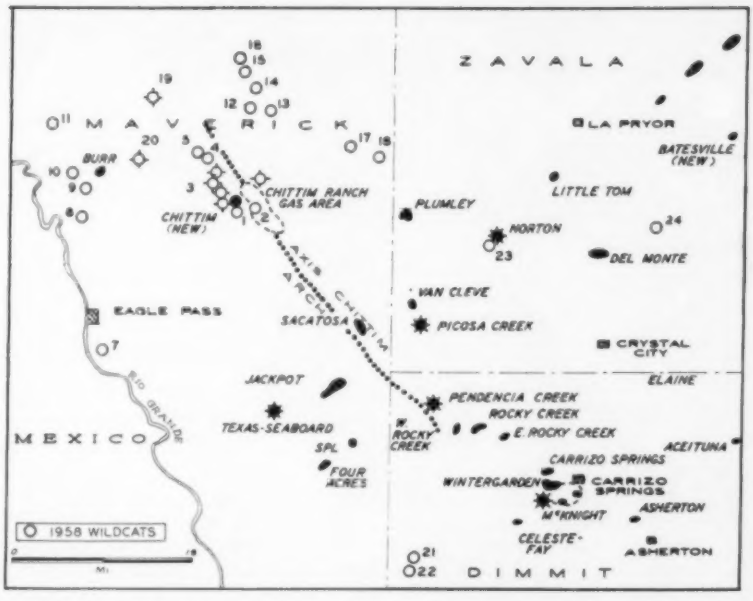
The discovery, 82-21 Cattani, was taken to basement at 9,291 ft., plugged back and completed in an interval at 7,610-7,725 ft. It tested at a rate of 1,200 bbl. daily of 31.8°-gravity crude through a ½-in. choke. The productive interval in this discovery corresponds with that of the Houchin pool.

All three discoveries point up the fact that there are still commercial quantities of oil to be discovered along the west side of the Mountain View field. However, these types of accumulations, stratigraphic and fault traps, have proved elusive targets. Other efforts to find such production along the Mountain View field trend in recent years have resulted in some significant failures.

Shell Oil Co., for instance, missed with a 9,898-ft. wildcat 9 miles northwest of Stenderup and 4 miles southeast of Bakersfield just last October. Victory Oil Co. suspended operations on a 10,230-ft. wildcat about 2½ miles northwest of Stenderup. In 1953, Pacific Western Oil Corp. drilled a 9,297-ft. dry hole in 23-30s-28e, about 6½ miles northwest of Stenderup.

In the immediate area of the Houchin pool, Hancock Oil Co., holder of a 25 per cent interest in the Houchin and Stenderup pools, missed with a 9,526-ft. dry hole just 1,500 ft. northwest of the discovery well in 1955. In the same year, Pacific Western Oil Corp. deepened a 9,288-ft. wildcat abandoned by Tidewater Oil Co. to 10,619 ft. 2 miles north of Stenderup. Tidewater also quit a similar test a little more than 1 mile north of Stenderup.

Largely as a result of its successes at Stenderup and Houchin, Union recently completed blocking out a 2,500-acre lease play in the city of Bakersfield proper. This involved some 10,000 signatures on more than 5,000 leases. The first test is slated for early next year. Here again, the attraction is Stevens sand production possibilities.




**TEXAS** wildcatters are eying the new oil and gas province in the northwest portion of the Rio Grande embayment.

# Maverick County Seethes

## with new wildcatting

A NEW SURGE of exploratory drilling appears to be sweeping Texas' far-southwestern Maverick County, where discovery, during 1957, of five more fields aroused hopes for finding a major producing area in this wide-open, relatively little-prospected region of the state.

A count of the new wildcat activity shows 23 wildcat tests started in the county since early December. Of these, 9, all relatively shallow, have been written off, leaving 14 operations now under way. These still mark the greatest amount of wildcat activity in the county at any time since the region came back into the active exploratory picture following the discovery of the county's first oil production in 1955.

Current activity stretches over a fairly wide area around the northwest, north, and northeast sides of the old Chittim Ranch gas area, the county's only production until 1955. This lies on the upper reaches of the Chittim Arch, a long-recognized, major geological feature extending in a southeasterly-northwesterly direction across the northern portion of the county, in the upper Rio Grande embayment.

Maverick County's play stretches northwestward along the anticline

### And Here They Are:

Maverick County—(1) John R. Bunn 1 Chittim Ranch; (2) Texas Oil & Exploration Co. 1-A Marstella Chittim, exploratory test in old Chittim gas area; (3) Monsanto Chemical Co. 1, 2, 3, 4, Mangum, completed dry since mid-December; (4 and 5) Monsanto Chemical Co. 5 and 6 Mangum, newly abandoned; (6) Theis Drilling Co. 1 Wright, January dry hole; (7) Voyles-Reed-Smith 1 Mikulinsky; (8) Highland Hills, Inc., 1 Hill; (9) Voyles-Reed-Smith 1 Airport; (10) T. G. Shaw 1 Thompson; (11) T. G. Shaw 1 Wipff; (12 and 13) Southworth & Wood 1 and 2 Chittim; (14, 15, and 16) U. M. Harrison 7-B, 6-B, and 4-B Sanger; (17 and 18) Southworth & Wood 1 Fessman and 1 Wozencraft; (19) U. M. Harrison 2-B Sanger; (20) Western Drilling Co. 1 Bandera.

Dimmitt County—(21) Sutton Producing Co. and Shamrock Oil & Gas Corp. 1 Eubanks; (22) Shamrock 1 Fitzsimmons.

Zavala County—(23) Norton Oil Co. and V. P. Grace 2 Norton (exploratory confirmation test for new discovery); (24) Allen Burr 1 Freed.

**MAVERICK COUNTY FIELDS**

| Field and discovery company— | Discovery year | Producing horizon | Depth (ft.) | No. wells | Production |
|---|---|---|---|---|---|
| Chittim Ranch: | | | | | |
| Rycade Oil Corp. | 1930 | Glen Rose | 5,600 | 5 | Gas |
| Sacatosa: | | | | | |
| Continental | 1955 | Eagleford-Buda | 3,100-4,100 | 1 | Oil |
| Continental | 1956 | San Miguel | 1,300 | 3 | Oil |
| SPL: | | | | | |
| Sutton | 1956 | Olmos | 1,300 | 2 | Oil |
| Chittim (New): | | | | | |
| T. G. Shaw | 1957 | Austin | 1,400 | 2 | Oil |
| | | Buda | 2,400 | 1 | Oil |
| Jackpot: | | | | | |
| Sutton | 1957 | San Miguel | 1,700 | 7 | Oil |
| Four acres: | | | | | |
| Sutton | 1957 | Olmos | 1,200 | 3 | Oil |
| Burr: | | | | | |
| Shaw-Pitcock | 1957 | Eagleford-Buda | 2,750 | 1 | Oil |
| Unnamed: | | | | | |
| Texas Seaboard | 1957 | Olmos | 625 | 1 | Gas |

from northwestern Dimmit County, scene of active exploration and development of Navarro and San Miguel sands the past 2 years. Drilling in Dimmit County has subsided during recent months although new and indicated discoveries in recent months provide additional incentive for revived activity both in currently productive, and deeper horizons.

Navarro-Olmos, San Miguel, Austin chalk, Eagleford, and Buda horizons are primary objectives of most of the present drilling. These are the zones, encountered at fairly shallow depths, which have proved productive in the county's newer fields. Glen Rose sand, at 5,600 ft., is the producing horizon of the county's old Chittim Ranch gas area. It offers a deeper potentially productive horizon, along with lower formations, but little of the newer drilling is being carried to those objectives.

At least four of the currently active tests in the county have encountered promising showings. One of these Southworth & Wood 1 Wozencraft (No. 18 on map), near the Zavala County line, is in process of an attempted completion in San Miguel sand in open hole at 1,980-2,300 ft. In the northwestern corner of the county, T. G. Shaw had good oil showings in the Eagleford at his 1 Wipff (No. 18) but is drilling ahead. Others include Voyles-Reed-Smith 1 Maverick County Airport (No. 9), west of the one-well Burr field, showings in a 3,600-ft. zone; and Texas Oil & Exploration Co. 1-A Marstella Chittim Estate (No. 2), in the old Chittim Glen Rose gas area, showings in Buda lime.

With the activity in Maverick County, new interest is being directed to adjoining meagerly explored Zavala County, on the east, where four new fields have been discovered within the past year.

Zavala County's latest discovery is about 12 miles northwest of Crystal City and about 10 miles east of the Maverick County line where Norton Oil Co. and W. P. Grace are opening gas production in San Miguel sand at 2,942-54 ft. This wildcat also tested gas in a 2,200-ft. Navarro zone. Operators now are drilling at their second well (No. 23 on map).

This is about 10 miles northeast of another new San Miguel gas discovery by Sutton Producing Co. at Picosa Creek, southeast of the old Van Cleve area, in the southwestern corner of the country near the Maverick County line. Sutton's second well now is being tested. Northeast of it, at Little Tom, San Miguel Lease & Royalty Co. has a small San Miguel oil-discovery well, completed last November. This followed a Navarro-Olmos gas discovery by W. H. Garr in a wildcat southwest of Batesville.

Another rank wildcat test is getting under way in the county. It is being drilled by Allen Burr on a prospect (No. 24 on map) about 15 miles northeast of Crystal City and about 6 miles northeast of the old Del Monte field. A 3,800-ft. test is planned.

Two Dimmit County wildcats (Nos. 21 and 22), anly a mile apart, near the Maverick County line, also are showing for production to extend the play a long jump southward. Both are testing a 3,800-ft. San Miguel horizon. One (No. 21) is a joint operation of Shamrock Oil & Gas Corp. and Sutton Producing Co. The other, drilled by Shamrock Oil & Gas Corp. alone, is being completed as a small pumper.

**PANHANDLE**

## Mississippian Pool Opened in Hutchinson

Sun Oil Co. opened a new Mississippian gas pool in northeastern Hutchinson County at its 1 D. B. Kirk, 21 miles northeast of Borger and 9½ miles south of Horizon-Morrow field.

The well flowed 4,400 M.c.f. of gas per day from perforations at 8,172-88 ft. Location is in Section 77, Block R., GB&NG Survey.

# ARKANSAS

## New Gas Area Opens In Logan County

A new gas discovery was reported in northwestern Arkansas last week. The discovery well is Gulf Oil Corp. 1 F. R. Borum in NW SE 18-6n-28w, 6 miles northwest of the town of Booneville in Logan County.

No official gage is available, but the operator reported the well flowed 2,200 M.c.f. of gas per day on 1-in. choke from perforations in the Atoka? at 4,888-4,910 and 4,914-26 ft.

The new gas area is on what is known as the Washburn anticline, a structure in the Arkansas River Valley basin. The well is still cleaning up and official completion will be delayed. Gulf's new strike is located 7 miles northeast of Gragg field, another basal Pennsylvanian gas area.

# LOUISIANA

**NORTH**

## West Olla Confirmation Well Completed in LaSalle

The confirmation well to West Olla field in LaSalle Parish, central Louisiana, is successful. George Belchic, Jr. and Mercury Drilling Corp. 2 Mills, SW SW 33-10n-2e, 1,100 ft. of the 1 Mills et al discovery well, flowed 33 bbl. of 29.5°-gravity oil daily plus 42 per cent basic sediment and water on 12/64-in. choke from perforations in the Wilcox at 2,298½-2,303½ ft.

The discovery well, located in 33-19n-2e, was completed in December 1957. It flowed 54 bbl. of oil per day from the Wilcox at 2,290-96 ft. on completion.

**EXPLORATION THIS WEEK**


| | |
|---|---|
| Texas | 179 |
| Arkansas | 180 |
| Louisiana | 180 |
| Wyoming | 182 |
| Appalachian | 182 |
| North Dakota | 183 |
| Canada | 183 |
| California | 191 |
| New Mexico | 192 |
| Successful Wildcats | 193 |

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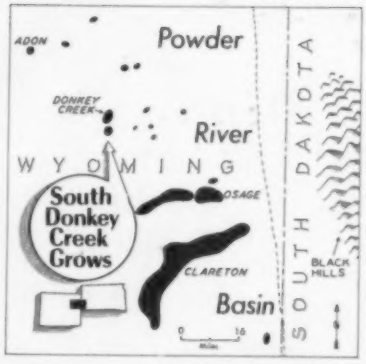
New completions promise

# Spurt in Wyoming drilling

SEVERAL WELLS in Wyoming's South Donkey Creek field in the Powder River basin were completed last week. True Oil Co. 4 Koch, C SW SW 17-49n-68w, flowed 792 bbl. of oil per day on ¾-in. choke from perforations at 6,465-88 ft. The 3 Koch, W½ NW 20-49n-68w, pumped 240 bbl. of oil per day. The 5 Koch, C SW NW 20-49n-68w, is testing on pump.

**1957 discovery . . .** South Donkey Creek was opened last year at True Oil Co.'s 2 Koch, C NW NW 20-49n-68w. The Crook County area is separated from Donkey Creek field by two dry Dakota holes. The field discovery well at South Donkey Creek flowed 50 bbl. of oil per hour on completion in the Dakota.

**Donkey Creek . . .** Donkey Creek field itself has both Dakota and Minnelusa-Pennsylvanian production. The Pennsylvanian discovery was made last year and was considered an important exploratory event for the northeastern portion of the Powder River basin. The field has several Dakota wells . . . the development of Pennsylvanian production is now the chief target of operators in the field.




**POWDER RIVER BASIN'S** South Donkey Creek field is growing. Three Dakota-Cretaceous wells were added last week.

# Green River discovery

revives gas exploration

EL PASO NATURAL GAS CO. released completed core and test data on its highly significant Desert Springs Unit gas discovery in Sweetwater County, southwestern Wyoming.

The well is shut in after flowing 7,800 M.c.f. of gas per day from Mesaverde-Cretaceous sands. Perforations are at 5,887-95 and 5,901-20 ft.

The Mesaverde top is 5,890 ft. Top of the Erickson is at 6,150 ft. The operator also tested the Lewis sand in this well, getting 5,620 M.c.f. of gas per day. When pipe was run, the Lewis section was cased off.

Earlier in the testing stages at the Desert Springs well, the Mesaverde recovered small amounts of gas during drill-stem tests. But after fracturing the well increased its output. The operator now plans a second well 1½ miles northwest on the 28,000-acre unit.

The Desert Springs Unit gas strike is in the eastern part of the Green River basin. It is considered one of the exploratory highlights of 1957 in this basin. Green River exploration is receiving a new boost in recent months after a period of comparative quiet.

## Hot Springs County Has Big Horn Basin Discovery

The first deep test ever to go down in old Grass Creek field in Hot Springs County, Wyoming, is an indicated Darwin sand discovery. Ohio Oil Co. recovered 3,087 ft. of free oil and 106 ft. of oil-cut mud on a 2-hour drill-stem test of the Darwin sand at 4,357-80 ft. at the 1 pre-Tensleep Unit, NE SW SW 18-46n-98w.

This significant Big Horn basin wildcat is the first test to go below the Tensleep-Pennsylvanian at Grass Creek. Age of the Darwin is Amsden or lower Pennsylvanian. The Darwin is a sand at the base of the Amsden, which is considered by most to be Pennsylvanian in age, although many call it Upper Mississippian-Lower Pennsylvanian.

Ohio's deep test at Grass Creek is on a new unit applying to all pre-Tensleep formations. The well is due to go on down to the Precambrian at about 6,900 ft. Grass Creek was opened in 1914. Oil production in the field is Tensleep, while some gas is found in the Cretaceous rocks.

### COLORADO

## Topeka Gas Discovery Finaled in Baca County

Amerada Petroleum Corp. opened a new Pennsylvanian gas field in the extreme southeastern corner of Colorado, 6 miles northwest of Kansas' Greenwood field. Production at the 1 Pride Unit, NW NW SE 23-33s-42w, is 1,426 M.c.f. of gas per day from perforations in the Topeka at 3,069-74 ft.

## Northwest Colorado Has New Production

New Niobrara - Cretaceous production was established last week in northwestern Colorado's Routt County, 5 miles southeast of Tow Creek-Niobrara field. The discovery well is Tennessee Gas Transmission Co. 1 U.S.A.-James, NE NE NE 25-6n-86w. The operator completed the well for a pump gage of 187 bbl. of oil daily from open hole at 4,094-4,800 ft.

# APPALACHIAN

### EASTERN KENTUCKY

## First Strike in Many Years in West Breathitt

In western Breathitt County and located about 20 miles southeast of Beattyville, a successful wildcat, first for the area in many years, has been completed. Test is that of Estill Creech et al, 1 Robert Gabbard which produced initially at the rate of 125 bbl. of oil daily from Corniferous lime topped at 1,736 ft. Two pays were logged: 1,738-53 and 1,760-65 ft. Well was completed natural at a total depth of 1,786 ft.

### OHIO

## Ironspot Pool Becomes Busy Ohio Area

Development of Ironspot pool northeast of Roseville in Newton Township, Muskingum County is progressing rapidly.

Although the area is limited to probably 2 square miles, production of both oil and gas has been very good, the initial daily production of oil ranging from 50 to 300 bbl. and as high as 4 M.M.c.f. open flow for the

gas wells, a majority of the wells making both oil and gas. Nine wells have been completed and five are now in the process of being drilled.

## Test hints strike In North Dakota

A RENVILLE COUNTY WILDCAT in North Dakota is an indicated Mission Canyon-Mississippian discovery. Gulf Oil Corp. recovered 1,505 ft. of free oil on drill-stem test at the 1 Busch and Nemaha Royalty, N½ SE NW 3-163n-85w, 5 miles northeast of Bluell field and 1½ miles south of the Canadian border.

**MISSION CANYON** oil was recovered on drill-stem test of Gulf Oil Corp. 1 Busch & Nemaha Royalty, promising Renville County its second oil field.

The indicated strike is in an area of scattered previous drilling. Nearest production is at Bluell field. The operator is drilling below 4,238 ft. The drill-stem test was made at 4,185-4,238 ft. Commercial success at the Gulf wildcat would give Renville County its second oil field. There is a small gas pool in the eastern part of the county.

## Canada tests boost Alberta oil hopes

LAST YEAR'S famous Beaverhill Lake oil finds in the Virginia Hills, Swan Hills, Edith Lake, Kaybob, and Iosegun River areas of central-west Alberta will hold the oil industry's attention in western Canada for some time.

The past week, however, will be remembered significantly by Shell Oil Co. especially. That firm's current exploratory test in the same Virginia Hills region came through in the Beaverhill Lake structure by giving up what appears to be a commercial showing of crude oil during the initial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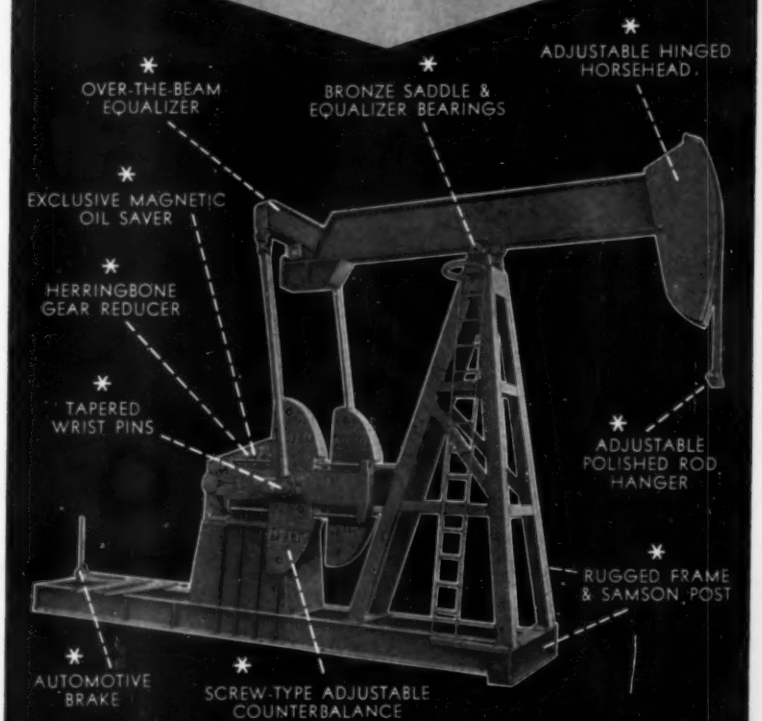


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test run in that Middle Devonian horizon.

The initial discovery was made back in February of 1957. This new strike is Shell's first major oil strike on Provincial Reserve lands after many attempts. The firm has had other exploratory successes in such areas as Waterton Park, where huge reserves of gas have been found, and oil strikes in the East Harmattan area.

**Unknown factor . . .** Producibility of the new Shell success is as yet an unknown factor. However, an 85-ft. interval starting 40 ft. high stratigraphically to the Virginia Hills discovery well which lies 7 miles north has been tested without any trace of formation water. As the pipe recovery was reverse-circulated out, an estimate on that important factor is the only thing available. It has been placed at 1,300 ft. of sweet gassy oil, 750 ft. of oil and gas-cut mud and a partially oil-cut water cushion.

The recent strike is Shell 10-17-64-13 Swan Hills, on LSD 10, 17-64-13w5. That places it (in addition to its close proximity to the Virginia Hills No. 9-20 strke) 34 miles east of the Phillips A7-22 Kaybob Beaverhill Lake oil strike, 115 miles northwest of Edmonton's city limits.

**In the Alberta region . . .** The Virginia Hills Provincial Reserve, on which the Shell test is situated, covers a total of 56 townships. It is currently broken up into 13 separate petroleum and natural gas reservations covering exploration rights on anywhere from two to four complete townships. The Alberta Government has yet to reap its "harvest" through sale of oil and gas rights on eight of the townships contained in it as they are still held by the Crown.

The area covered by this reserve now contains five of the eight indicated produceable Beaverhill Lake oil wells in this province. And the Home-Hudson's Bay-Union Oil team shares interests in the initial strike made. Other producers in this general region have been brought in by the Home-Regent Refining (Canada), Ltd., team; while Kaybob-Iosegun's three successes have been drilled by the Phillips Petroleum Co.-British American Oil Co.-California Standard Co. group.

The third producer in that latter area was only completed this week. Phillips Petroleum was operator on the test, Phillips A12-15 Kaybob, that lies 1 mile southwest of the Phillips A7-22 Kaybob oil producer. No treatment was necessary before the well was brought in and it produced 365 bbl. of oil during its first day of testing.

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April 25, 1957

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By: A F Knappenberger
Partner

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—A. F. Knappenberger, Partner

On location in North Texas, the Wheland HP-8000 pump which has performed so well for K&H Drilling Co.

At the side, left to right, are Mr. Alton Henley, Co-owner; Mr. A. B. Drake, Wheland representative; Mr. A. F. Knappenberger, Co-owner.

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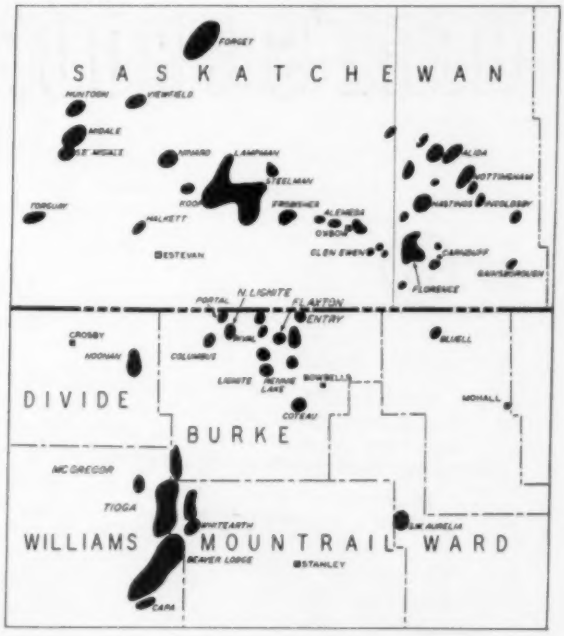
# New Williston map

NORTHWEST MAPPING CO., Bismark, has new maps of the Williston basin available. One map shows all producing areas, dry holes, counties, towns, and townships and ranges.

The area covered includes southwestern Manitoba, southeastern Saskatchewan, northeastern and eastern Montana, northeastern Wyoming, South Dakota, and all of North Dakota. Scale is 1 in. equals 12 miles.

The other map is of the same area with fields and counties. They have been posted to date and are of great value to the map watchers of Williston county.




**HERE IS** a section of the Williston basin taken from Northwest Mapping Co.'s new map of the region. Shown in this section are the new producing areas of Burke County in North Dakota and parts of southeastern Saskatchewan.

# Oklahoma pushes shallow play

FAST-MOVING Hunton (Siluro-Devonian) development in Kiowa County's Komalty area is paying off with prolific oil wells, giving southwestern Oklahoma one of its biggest shallow plays in many years.

Komalty is located northeast of the city of Hobart in the Wichita Mountain uplift region of southwestern Oklahoma. The field is divided into two segments. The shallow play began here last year and is now in full swing.

Some recent completions in the lime development are: L. H. Armer 1 Fuchs, SE SE SE SE 30-6n-16w. This one flowed 1,320 bbl. of oil per day with the bottom of the hole at only 518 ft. The No. 5 Fuchs, SW SE SE SE Section 30, flowed 100 bbl. of oil per hour on a 2-hour test (2,400 bbl. per day). Open hole was at 412-418 ft. The No. 4 Fuchs, NE SE SE SE Section 30, flowed 600 bbl. per day from 528 ft.; the 3 Fuchs, NE SE SE SE Section 30, made 600 bbl. per day from 542 ft.; the 6 Fuchs, NW SE SE SE Section 30 flowed 1,440 bbl. per day, and the 7 Fuchs in SE NE SE SE Section 30 flowed 480 bbl. per day from 551 ft.

Carco Oil Co., another operator in the area, got a 1,008-bbl. per day well at 2-B Fuchs, SE SW SE NE Section 30. Pay was at 551 ft.; Carco's 3-A Fuchs, NE SW NE Section 30, flowed 624 bbl. per day from 455 ft.

Oil & Gas, Inc. 6 Fuchs, SE NW SW NE Section 30, flowed 1,440 bbl. per day from 429 ft.

**LAST YEAR'S** shallow play near Hobart is developing quickly into large-scale production.

**NORTHWEST**

## Morrow Field Opened In Harper County

A big gas well in Harper County was completed on calculated open-flow potential last week for 54 M.M. c.f. of gas per day. This discovery opened a new Morrow sand area in Harper County, 6 miles northwest of Buffalo. The northwestern Oklahoma discovery is Monsanto Chemical Co. 1 Doby, NE SE NW 1-27n-24w. Production is natural from perforations at 6,142-47 ft.

The big gas flow is based on these choke sizes: on ¼-in. choke it flowed 2,500 M.c.f. per day; on ½-in. choke it flowed 7,500 M.c.f. per day; ⅞-in. choke, 10,600 M.c.f. per day; 1-in. choke, 11,300 M.c.f. per day.

## Link Well Watched In Northwest Oklahoma

A closely watched link well in the Highland-Laverne gas district of eastern Beaver and western Harper counties in northwestern Oklahoma appears assured of success. The important wildcat is Union Oil Co. of California's 1 Riggs, C NE SW 10-26n-26w, Harper County, just west of the main section of Laverne gas field.

The operator tested gas in the Hoover sand at 4,224-34 and 4,239-68 ft. Gas flowed at the daily rate of 4,500 M.c.f. through 23/64-in. choke.

This linkup well is 1 mile west of Laverne field. Successful completion will join Laverne with Highland, two prolific gas areas in northwestern Oklahoma. The well is now shut in for outlet.

**PANHANDLE**

## Cimarron Wildcat Hints Oil Production

An indicated oil discovery was reported in the Keyes gas-field area of Cimarron County. The discovery prospect is Colorado Oil & Gas Corp. 1-18 State, C NE 18-4n-8eCM.

Gas flowed on tests at 4,810-16 ft. at the estimated rate of 1 M.M.c.f. per day. After fracture, the operator gaged 6,115 M.c.f. of gas per day and 4 bbl. of oil per hour.

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4. Top flight service is yours every time with Welex. The confidence of the entire oil industry in Welex wireline tools has been earned by years of unexcelled service that men in your position have demanded . . . and received.

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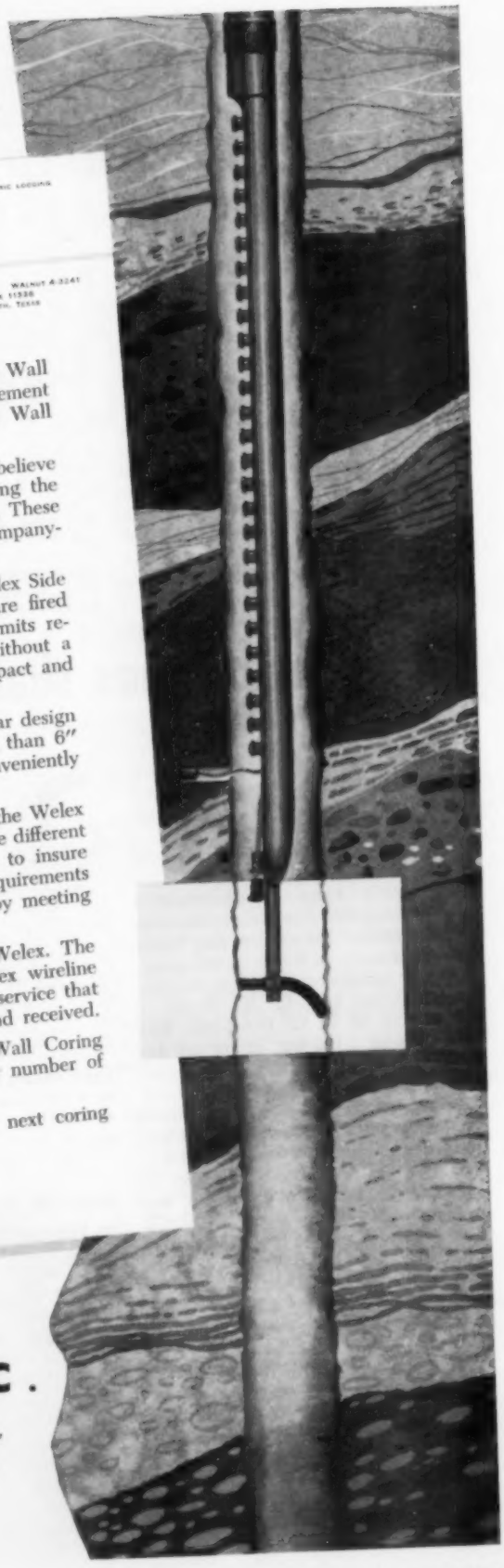
May we give you even further proof on your next coring job?

Very truly yours,

Your Welex Representative



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# Los Angeles to host AAPG Annual meeting in March

ABOUT 4,000 GEOLOGISTS and paleontologists are expected to attend the 43rd annual meeting of the American Association of Petroleum Geologists, which will be held jointly with the 32nd annual meeting of the Society of Economic Paleontologists and Mineralogists, in Los Angeles, March 10-13, 1958.

Convention headquarters will be at the Biltmore Hotel and the technical sessions will be held in the Philharmonic Auditorium.

Graham B. Moody, consultant, Berkeley, Calif., who is president of AAPG, will welcome the group to California. Leo Newfarmer, Pacific Coast exploration manager for Shell Oil Co., is general chairman of the convention.

Central theme of the technical program will be petroleum possibilities and development in lands bordering the Pacific Ocean, with considerable emphasis on a secondary theme of thrust faulting in relation to oil occurrences. Included are papers on California, Canada, Alaska, Soviet Russia, Japan, Taiwan, Philippines, Indonesia, New Guinea, Australia, New Zealand, the west coast of South and Central America, and Mexico.

A highlight of the meeting will be a joint symposium on the first day, arranged by the SEPM and AAPG research committee, on silica in sediments.

Keynote speaker will be H.S.M. (Max) Burns, president of Shell Oil Co., New York, who recently was elected board chairman of the American Petroleum Institute. Other speakers include Frank A. Morgan, Los Angeles consultant, who is past president of AAPG, and Lewis G. Weeks, of Standard Oil Co. of New Jersey, New York, who is past vice-president. Dr. U. S. Grant IV, president of the AAPG Pacific section, also will address the meeting.

The Sidney Powers memorial medal, awarded annually by the AAPG in recognition of distinguished achievement in petroleum geology, will be presented to Dr. Paul Weaver, of Houston, a past president of the association.

Those to be awarded honorary memberships in AAPG at this meeting are Dr. Kenneth C. Heald, Fort Worth; William B. Heroy, Dallas; Dr. A. I. Levorsen, Tulsa; Dr. Raymond C. Moore, University of Kansas, Lawrence, and Wallace E. Pratt, Carlsbad, N. M. Messrs. Heroy, Levorsen and Pratt are past presidents of the AAPG, and Dr. Moore served for many years as editor of the AAPG bulletin.

Honorary membership in SEPM will be awarded to Charles E. Decker, University of Oklahoma, Norman; Marcus A. Hanna, Houston, and Hans E. Thalmann, Stanford, Calif. Recipients of other awards by SEPM, for the best 1956 papers, are Christina Lochman-Balk, Socorro, New Mexico (Paleontology); and Maurice A. Carrigy, University of Western Australia, Nedlands, (Sedimentary Petrology).

## Correction

On page 267 of the Journal's Annual edition, January 27, 1958, the heading "Wildcat Completions by Counties and Development Completions by Counties" in Texas Districts 7-C & 8 and District 9 have been transposed. The headings in each case should be reversed.


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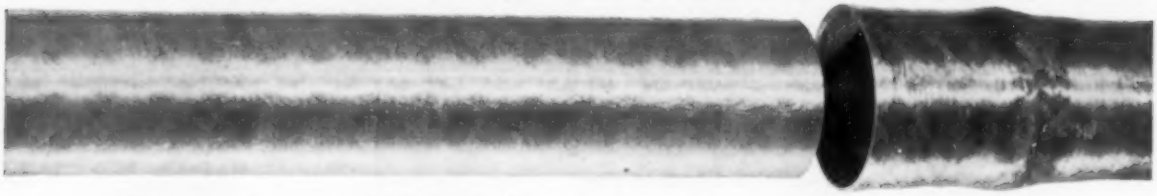

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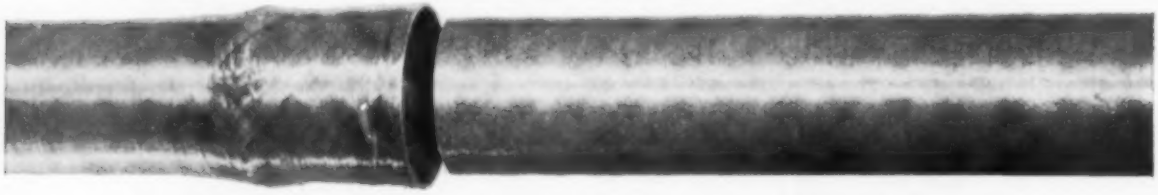

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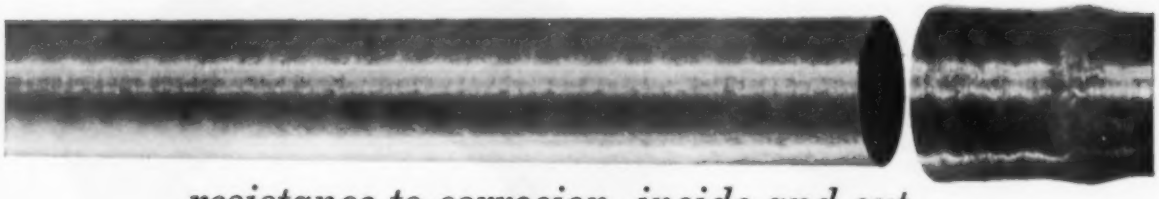

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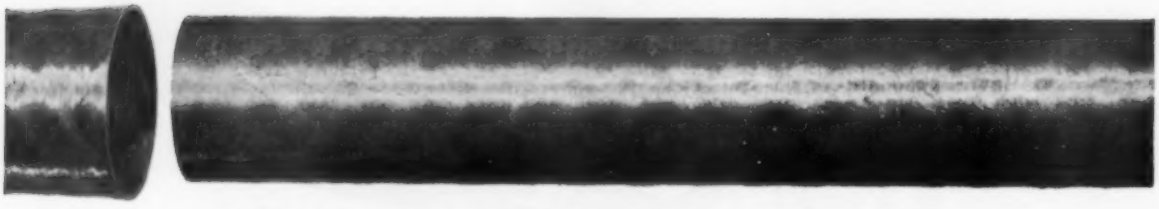

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# Offset Paces California Drilling

SUPERIOR OIL CO. paced California drilling activity last week with an excellent offset to its recent new pool discovery on the south flank of the Paloma field in Kern County. While Superior was counting its success, three closely watched wildcats in other parts of the state failed to find production.

Moving to a northwest location, Superior brought in 74-10 KCL as a dual completion in the Miocene Stevens sand at 10,130-10,160 ft. The upper zone was making 248 bbl. daily of 57.8° condensate through a 13/64-in. choke. The lower zone was flowing 244 bbl. daily of 33.8°-gravity crude through a 10/64-in. choke.

The discovery well, 85-10 KCL, which was completed last October, was producing from a 30-ft. interval 10 ft. higher than in 74-10 KCL. It was put on production as a condensate well making 250 bbl. daily of 56.6° crude through a 12/64-in. choke.

This new play has been labeled the South Area, Stevens pool, of the Paloma field.

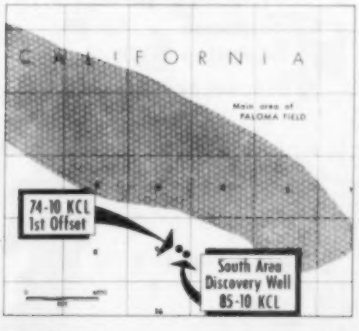
Among the dry holes, the one attracting the most interest was Union Oil Co.'s first wildcat on its town-lot leases in the southern part of Bakersfield in Kern County. Union took the test, A-1 Mon to 8,516 ft. before plugging and abandoning it. The rig has been skidded 10 ft. to a new site and Union was making hole below 1,957 ft.

The first test failed to find any encouraging signs in either the Pliocene Kernco-Martin zone, which is productive in the Fruitvale field about 3 miles northwest of the drill site, or in the deeper Miocene Stevens zone.

Both tries are slant drilled in a northerly direction.

Another closely watched wildcat which failed to find production was Standard Oil Co. of California, Western Operations, Inc.'s, 1 Lloyd-Butler located about 1½ miles south of Shell Oil Co.'s prolific Saticoy field in Ventura County.

The third significant wildcat failure was Richfield Oil Corp.'s 33-15 KCL-H in the San Emidio Nose area about 7 miles northwest of Wheeler Ridge field. Richfield went to 14,471 ft. on this Eocene test before calling it quits.




**AN OFFSET** to a recent new pool discovery in Kern County, California, is producing excellent results for Superior Oil Co.

**TEXAS PANHANDLE**

## Atoka Is New Pay at R.H.F. Field

Ochiltree County's R.H.F. Morrow field has a new pay, the Atoka of basal Pennsylvanian age. The discovery well is Paul M. Haywood 1-20 J. V. Stump in Section 20, Block JT, TWNG Survey, 8 miles southwest of Farnsworth.

The well flowed 818 bbl. of oil per day on ¾-in. choke from perforations in the Atoka at 7,678-7,700 ft. The well also flowed 1,231 bbl. of oil per day from the Morrow sand at 7,956-66 ft. on ¾-in. choke.

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New Mexico's Greenwood opens

# Production in Pennsylvanian

EDDY COUNTY has a new Pennsylvanian gas-distillate discovery—Pan American Petroleum Corp.-Buffalo Oil Co. 2 Greenwood Unit. The well was completed for a potential of 6,640 M.c.f. of gas and 279 bbl. of 60°-gravity distillate per day on 44/64-in. choke. Location is 34-18s-31e.

Recovery was from the Pennsylvanian through perforations 11,425-38; 10,912-48, with top of pay at 10,912 ft. Well was drilled to total depth of 12,925 ft. plugged back to 11,495 ft. Pan American operates and shares equal interest in the well with Buffalo.

The discovery well—Pan American-Buffalo 1 Greenwood—was completed in February 1957, opening thick pay in the Siluro-Devonian upper and lower zones. The well was subsequently recompleted in the upper zone for production at the rate of 9.6 M.M.c.f. of gas and 35 bbl. of distillate a day. Top of the Siluro-Devonian was 12,368 ft.

A drill-stem test of the Pennsylvanian in the No. 1 well recovered distillate at the rate of 15 bbl. an hour and gas at the rate of nearly 11 M.M.c.f. a day. No further tests of the Pennsylvanian have been made on the No. 1.

Operator tested the Siluro-Devonian on the No. 2 well and recovered water prior to completion in the Pennsylvanian.

The unit is located about 40 miles southeast of Artesia, N. M.

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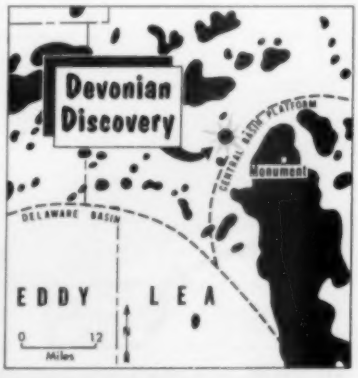
## Completion ready for New Mexico well

UNION OIL CO. of California 1-35 South Vacuum Unit made heavy flows of oil on production tests and is ready for completion as a Devonian discovery. Location is in south-central Lea County, in 35-18s-35e, about 17 miles west of Hobbs.

**Thick pay section . . .** Operators had not reported top of the Devonian at this writing. Core recovery from 11,646-11,703 ft. was 57 ft. of lime and dolomite, bleeding oil. Perforations between 11,643-80 ft. swabbed 72 bbl. of oil in 8 hours. A 500-gal. acid treatment resulted in a 60-bbl. flow in 50 minutes through 1-in. choke, later increasing to 45 bbl. of oil in 1 hour through ½-in. choke. Tubing pressure was 800 psi.

Latest flow test was 361 bbl. of 48° oil in 5 hours through ½-in. choke, for a daily rate of 1,733 bbl. Gas-oil ratio was nearly zero, indicating water drive. Other pays . . . During drilling, Union's test also indicated discovery production from Middle and Lower Permian sections. On drill-stem test of the Leonard at 8,845-8,984 ft. the well flowed 30 bbl. of 33° oil in 4 hours ¼-in. choke, and




**UNION OIL CO.'S** big discovery is in south-central Lea County.

reversed out an additional 44 bbl. of oil from the tubing.

A 3-hour test in the Wolfcamp at 10,059-10,149 ft. recovered 1,140 ft. of oil and 660 ft. of heavily oil and gas-cut mud.

### NORTHEAST

## San Miguel Wildcat Quits, New One Begins

SAN MIGUEL COUNTY had one test down and a new one coming up. The new prospect is Capitol Petroleum Co., Wichita Falls, 1 Hampton Ranch in NW NW 9-13n-30e. Drill site is 12 miles northwest of Hudson townsite. Projected depth is 7,000 ft.

Miami Petroleum Co., Abilene, 1 Hoover Ranch in NW NW 14-12n-28e, San Miguel County, was reported dry at 6,848 ft., total depth, with no shows. Miami Petroleum's 1 Bell Ranch in 34-14n-26e, about 18 miles to the northwest of 1 Hoover Ranch was dry last month at 2,672 ft.

## *Successful Wildcats*

### CALIFORNIA

Orange County: W. J. Hamilton, operator, 1 Hamilton Fee, 2-6s-11w, 347 BOPD, 208 bbl. net, 40 per cent cut, 20.7°-gravity, 28/64-in. choke, TD 4,810 ft. (Well formerly was completed in oil sand at 2,601 ft. with TD. of 2,765 ft. Well was redrilled to 4,810 ft. for new "C" zone discovery.)

Ventura County: Standard Oil Co. of California, Western Operations, Inc., 1 H. O. Borchard, SE SE 21-2n-22w, 759 BOPD, 31.6° gravity, 0.8 per cent cut, 18/64-in. choke, perfs. 10,810-11,267 ft., TD 11,620 ft. (New Sespe sand field discovery 2½ miles northwest of Oxnard field.)

### COLORADO

Washington County: Joe Kramer 1 Blake, C SE NW 21-1s-55w. IPP 155 BOPD, "D" sand 4,850-54 ft. TD 4,966 ft. New pool.

Larimer County: Lakota Petroleum Co. 1 Welty, C NW SE 33-4n-69w. IPP 13 BOPD, 4 BW. Timpas 4,489-92 ft., 4,492-4,516 ft. TD 6,411 ft. New pay in Highland field.

Routt County: Cabeen Exploration Co. 1 Fitch, 6-6n-86w. IP 90 BOPD, 39°. Niobrara 3,690-3,738 ft. TD 3,738 ft. New pool.

Logan County: Brack Drilling Co. 1 Haynes, C SW SW 14-8n-48w. IP 1,200 M.c.f. of gas per day, "D" sand 3,966-76 ft. 3,982-87 ft. TD 4,177 ft. Opens Daily pool.

LaPlata County: Caulkins Oil Co. 3 Ute, 24-33n-14w. IP 169 M.c.f. of gas per day, Paradox 8,950-9,046 ft. TD 9,580 ft.

### EASTERN NEBRASKA

Dundy County: James M. Cline Oil Co. 1 Jones, C SE NW 21-1n-37w. IPP 60 BOPD, Lansing-Kansas City 4,175-87 ft. TD 4,600 ft. New pool.

### ILLINOIS

Bond County: National Associated 1-A F. J. Zeller, NE SW 35-6n-5w. IPF 20 BOPD. Penn. 642-49 ft. TD 649 ft. Opens Smith Douglas pool.

Jasper County: J. W. Rudy 1 A. M. Kesler, NE 11-6n-10e. IPP 75 BOPD, 5 BW. McClosky 2,699-2,712 ft. TD 2,719 ft. Extension to Clay City Consolidated field.

Wayne Misener Drilling Co. 1 Parker, NW SE NE 32-8n-9e. IPP 14 BOPD. McClosky 2,849-52 ft. TD 2,918 ft. Opens Gila pool.

Washington County: C. E. Brehm 1 N. Garlich, SE SE NE 6-1s-4w. IPP 45 BOPD. Devonian 2,177-92 ft. TD 2,280 ft. Opens East Memphis pool.

### KANSAS

Rooks County: C. & G. Drilling Co. and D. C. Hansen 1 Thyfault, NE NE SW 8-9s-20w. IPP 87 BOPD, 29.1°. Arbuckle 3,714-26 ft. TD 3,726 ft. Opens South Arpin pool.

Trego County: Jones-Shelburne & Farmer 1, SW SE NE 28-11s-24w. IPP 120 BOPD, 36°. Lansing-Kansas City 4,008-12 ft. TD 4,129 ft. Opens Boda pool.

Ellis County: Hinkle Oil Co. 1 Reidel, C E½ NE 27-13s-16w. IPP 59 BOPD, 35.4°. Gorham 3,453-37 ft. 3,457 ft. Opens Air Base pool.

Pawnee County: D. R. Lauck 1 Wedel, NE NE SE 14-21s-16w. IPP 174 BOPD, 37.2°. Simpson 3,781-94 ft. TD 3,920 ft. Opens West Sweeney pool.

Edwards County: D. R. Lauck and Sunray 1 Lunz, NE NE NE 21-24s-16w. IPP 15 BOPD, 8 per cent water. Kinderhook sand 4,299-4,315 ft. TD 4,387 ft. Opens new pool.

Butler County: Crowe Drilling Co. 1 Glassen, SW SE SE 1-24s-3e. IPP 143 BOPD, 41°. Miss. 2,442-48 ft. TD 2,741 ft. Opens Mellor pool.

Sedgwick County: Renfro Drilling Co. 1 Dubois, C N½ SE NW 3-25s-2e. IPP 57 BOPD, 20 per cent water, 40°. Burgess 2,830-38 ft. TD 3,410 ft. Opens Dubois pool.

Butler County: A. D. Allison 1 Asmusson, NW NW SE 16-29s-4e. IPF 248 BOPD, 35.4°. Arbuckle 2,696-2,700 ft. TD 2,700 ft. Opens Asmusson pool.

Sumner County: Brunson Kendrick et al, 1 Hughes, SW SW NE 16-30s-1e. IPP 250 BOPD, Simpson 3,802-10 ft. TD 3,810 ft. Opens West Bellman pool.

Harper County: Natural Gas & Oil Co. 1 Gerber, SW SE SW 28-31s-5w. IPF 930 BOPD, 44.8°. Simpson 4,637-44 ft. TD 4,667 ft. Opens Gerber pool.

Morton County: J. M. Huber Corp. 1 Dreyer, C SE SE 17-32s-43w. IP 2,025 M.c.f. of gas per day, Marmaton 3,993-4,001 ft. TD 5,175 ft. Opens Dreyer pool.

Meade County: Republic Natural Gas Co. 1 Fox, NE 3-35s-30w. IPF 30 BOPD, 27 BW, 45°. 500 M.c.f. of gas per day. Toronto 4,402-08 ft. TD 6,237 ft. New pay in Adams Ranch field.

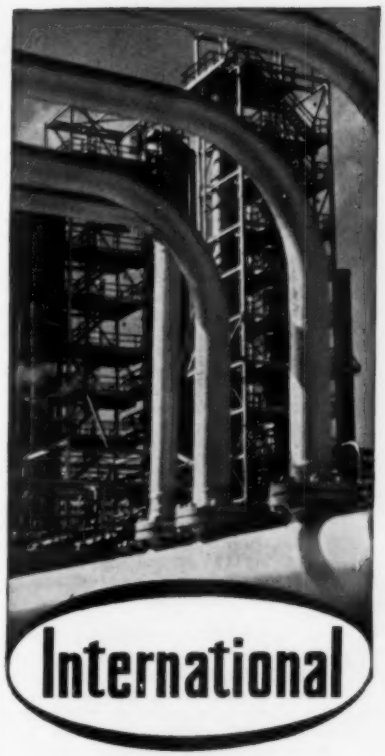
Clark County: Pure Oil Co. 1 C. H. Tuttle "C," C NW NW 10-35s-21w. IP 805 M.c.f. of gas per day. Morrow 5,625-38 ft. TD 5,790 ft. New pool.

### KENTUCKY

Henderson County: Gilliam Drilling Co. 1 Sandefur, 5-O-26. IPP 6 BOPD. Penn. 698-706 ft. TD 720 ft. Extension to Euterpe pool.

### MICHIGAN

Saginaw County: Foster Sayers 1 Judd SE SE NE 11-10n-5e, Taymouth Township. Elev. 612 ft., Berea 1,608 ft., Squaw Bay-Traverse 2,077 ft., TD 2,135 ft. 220,000 cu. ft. gas. (New gas field.)

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### MISSISSIPPI

Adams County: D. Whitaker and J. K. Wright Jr., 1 Whittington Heirs, 33-6n-2w. IP 127 BOPD, ⅛-in., 40°, TP 475 psi., perfs. 5,419-22 ft. (Wilcox). TD 6,509 ft. Elev. 257 ft., Wilcox 4,267 ft., base Baker shale 6,077 ft. (New field—Moss Hill.)

### MONTANA

Valley County: Northern Natural Gas Co. 1-A Erickson, NW SW 25-30n-36e. IP 900 M.c.f. of gas per day, Bowdoin 1,450-94 ft. TD 1,846 ft. Shut in.

Daniels County: Pan American Petroleum Corp. 1 Edith Godden, C SE SE 5-33n-49e. IPP 60 BOPD, 90 BW, 33.7°. McGowan 6,410-14 ft. TD 9,556 ft. New pool.

Glacier County: Murphy 1 State, 23-37n-6w. IPP 99 BOPD, 14 BW, 25.6°. Madison 3,262-80 ft. 3,280 ft. New pool.

### NORTH ARKANSAS

Franklin County: Athletic Mining & Smelting Co. and Carter Oil Co. 1 J. W. Pendergrass, NE NE NW 17-8n-27w. IP 7,245 M.c.f. of gas per day, open flow, Morris sand 2,575-89 ft. Cecil sand 4,572-86 ft. Orr sand 5,309-48 ft. TD 5,757 ft. New pays (Morris and Cecil) in Aetna pool.

### NORTH DAKOTA

Burke County: Petroleum Corp. of America et al, 1 Jorgens, C NE NE 28-162n-91w. IPF 85 BOPD, 42 BW, 39°. Midale 6,253-61 ft., 6,265-71 ft. TD 6,420 ft. New field.

Northwest Drilling Co.-Central Leduc Oil Co. 1 Klitzke, 17-163n-91w. IP 17 BOPD, 15 BW, 39.2°. Midale 5,981-92 ft. TD 6,410 ft.

Williams County: Amerada Petroleum Corp. 1 Boe-Olson Unit, NE 15-155n-96w. IPF 711 BOPD, 74 BW, 40.9°. Devonian 1,050-1,370 ft., Silurian 11,373-11,584 ft. TD 14,154 ft. Deep test in Beaver Lodge field.

### NORTH LOUISIANA

Grant Parish: Bert and Glen D. Loe 1 William Smith estate, 32-9n-1e. IPP 20 BOPD, 280 BW Wilcox 1,821-24 ft. TD 2,780 ft. Opens Selma field.

Tensas Parish: Jett Drilling Co. and Sun Oil Co. 1 Fisher Lumber Co. "H," C SE SE 4-12n-11e. IPF 110 BOPD, 43.8°. Tuscaloosa 8,393-8,403 ft. TD 8,501 ft. Opens Saranac field.

### NORTH TEXAS

Wise County: Fort Bend Oil Co. 1 Gilbert Ensley, Sec. 8, Cook CSL Sur., A-165, Caddo lime pay discovery in Alvord field. Originally completed in Atoka conglomerate. Recompletion IP 192 BOPD, 16/64-in., 41°, GOR 1205, CP 200 psi., perforations 5,373-91 ft.

Young County: I. A. Stephens 1 Burgess, Clark Smith Sur., A-1634, 1 mi. S Bend. IP 131 BOPD, 10/64-in., 42°, GOR 320, TP 900 psi., Strawn 2,983-3,002 ft. TD 4,516 ft.

### OHIO

Coshocton County: Roberson - Williams 1 B. E. Dreher, Lot 4, Tuscarawas Township. IP 440 M.c.f. of gas per day, Clinton sand 3,685-3,732 ft. TD 3,828 ft. New gas pool.

### OKLAHOMA

Stephens County: Parker Drilling Co. 1 Roberts, C SW SW NW 29-2s-5w. IP 7,600 M.c.f. of gas per day, Penn. cong. 2,915-26 ft. TD 3,041 ft.

Jefferson County: Carter Oil Co. 6 Robberson Heirs, SE SW NW 23-3s-4w. IP 105 BOPD, 24 bbl. water, 37.1° and 20° gravity. Upper Fusiliana 2,248-62 ft. and first Healdton sand 1,581-95 ft. TD 3,000 ft.

Love County: George Cameron, Jr. 1 Haynes, C SE NE 7-7s-3e. IPF 224 BOPD, 75 bbl. water, 37.5°. Basal Oil Creek sand 9,866-86 ft. TD 9,969 ft.

Cimarron County: The Texas Co. 1 Youtzler, C SW NW SE 23-1n-9eCM. IP 7,040 M.c.f. of gas per day, Atoka sand 4,283-97 ft., Morrow sand 4,576-82 ft. TD 5,963 ft. New field.

Stephens County: Goff-Leeper Drilling Co. 1 McKinney-Abney, SE NW 15-2n-7w. IPF 244 BOPD, 44° gravity. Niles 7,533-43 ft. TD 8,550 ft.

McClain County: R. Stenzel et al 1 Hanley, C SE NW 4-5n-3w. IPF 305 BOPD, Hart 8,434-37 ft., Hunton 8,780-85 ft. TD 9,827 ft. New pay (Hart) in Northeast Payne pool.

Kiowa County: Joe B. Bourland 1 Burton, C SW NE NE SW 32-6n-16w. IP 3,000 M.c.f. of gas per day, lime 465-602 ft. TD 602 ft.

Oklahoma County: Pure Oil Co. 1 F. B. Wafford, NE NE SW 5-11n-1e. IP 2,175 M.c.f. of gas per day, Unconformity sand 5,784-5,802 ft. TD 6,900 ft.

Lincoln County: A. Finston and Wakefield Oil Co. 1 Mee, NE NE NW 23-13n-3e. IPP 160 BOPD, 38° gravity, Prue 4,208-18 ft. TD 4,580 ft.

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Noble County: Spartan Oil & Gas Co. 1 Turner, SE SE NW 1-20n-2w. IPF 768 BOPD, lower Skinner sand 4,873-85 ft. TD 5,047 ft.

Grant County: J. M. Huber Corp. 1 Sprague, NE SE 27-26n-5w. IPF 96 BOPD, 288 bbl. water per day, 41.5° gravity. Mississippi chat 5,178-87 ft. TD 5,203 ft.

Kay County: Toto Gas Co. 1 Snyder, NW NW NW 28-26n-1e. IPP 74 BOPD, 86 BW, 43°. Red Fork sand 3,991-99 ft. TD 4,216 ft.

Osage County: White Star Oil Co. 1 Lillian Matthews, NW NW SW 21-26n-9e. IPF 810 BOPD, 34°. Burgess 2,201-07 ft. TD 2,310 ft.

Grant County: Atlantic Refining Co. 1 Yerian, NW NW 26-28n-6w. IP 7,000 M.c.f. of gas per day, Cherokee sand 4,774-86 ft. TD 4,881 ft.

### PENNSYLVANIA

Indiana County, Buffington Township: Columbian Carbon Co. 1-1848 George, elevation 1,990 ft., 3,217,000 cu. ft., gas in Oriskany sand after fracture, rock pressure 4,425 psi. in 16 hours, Tully 7,215 ft., Onondaga 8,259 ft., chert 8,275 ft., Oriskany sand 8,406 ft. TD. 8,432 ft.

### SASKATCHEWAN

Beckwith-Tidewater 2-12 East Burrows, LSD 2, 12-16-1w2. Jurassic oil discovery. TD 3,900 ft.

Cal-Standard 7-21 Routledge, LSD 7, 21-9-25w1. Lodgepole oil well. TD 2,137 ft.

### SOUTH ARKANSAS

Lafayette County: John C. Robbison, Jr. and Jackson Oil Co. 1 Pennington estate, IPF 56 BOPD, 29.6°. Tokio 3,030-33 ft. TD 3,105 ft. Opens Lewisville-Old Town pool.

### SOUTH LOUISIANA

Beauregard Parish: Sunray Mid-Continent Oil Co. 2-B Lutcher-Moore, 30-7s-11w. IP 42 BOPD, 9/64-in., 35°, GOR 333 cu. ft. per barrel, TP 900 psi., perf. 9,485-92 ft. (Cockfield). TD 10,600 ft. (New field—3 miles southwest of Cowards Gully field.)

Cameron Parish: Fifteen Oil Co. 1 Lucien Sturlese, 12-15s-5w. IP 76 BOPD and 2,570 M.c.f. daily, 7/32-in., 51.6°, TP 3,315 psi., perfs. 10,622-25 ft., and (dual completion) 20 BOPD and 2,605 M.c.f. daily, $\frac{7}{16}$-in., 45.4°, TP 3,250 psi., perfs. 10,386-01 ft. TD 13,020 ft. (New pays in Grand Chenier field.)

### SOUTHWEST TEXAS

Duval County: Humble Oil & Refining Co. 6-K Duval County Ranch Co., Sec. 153, CCSD&RGNG Sur. IP 68.38 BOPD, ⅛-in., 45°, GOR 287 cu. ft. per barrel, TP 300 psi., perfs. 2,126-30 ft. (Jackson). TD 2,350 ft. (New pay in West Charamousca field.)

G. L. Rowsey 1 Francisco C. Hernandez, Sur. 56 (6 miles southwest of San Diego). IP 6.23 BOPD, $\frac{7}{16}$-in., 42.2°, GOR 175 cu. ft. per barrel, TP 90 psi., perfs. 5,475-87 ft. TD 6,011 ft. (New pay in Cadena field.)

Duval County: S. H. Howell and George Taggart Jr., 1 Vaello, Sec. 6, R. Fletcher Sur., A-215 (3 miles southeast of Benavides). IP 114 BOPD, $\frac{7}{16}$-in., 44.2°, GOR 1,420 cu. ft. per barrel, TP 260 psi., perfs. 4,800-12 ft. (Hockley-Woodley sand). TD 4,977 ft. (New field—1¼ miles northeast of Benavides field.)

Hidalgo County: Harrell Drilling Co. and H. G. Nelms 1 Maymie Lammers Unit, Sec. 25, Alamo Land & Sugar Co. Subd. (3 miles southwest of Donna). Shut-in gas-condensate well, no gage, dually completed, perfs. 5,380-5,400 ft. (upper Frio) and 5,466-80 ft. (lower Frio). TD 5,596 ft. (New pays in Los Torritos field.)

Hargrave Oil Corp. and W. E. Colson 1 Chandler-Jackson Unit, Blk. 57, Valley Farms Subd. (7 miles east of McCook). IP 12,000 M.c.f. daily, absolute open-flow potential, GLR 69 M.c.f. per barrel, 52.2°, perfs. 9,418-46 ft. TD 11,125 ft. (New pay in North Monte Christo field.)

Jim Hogg County: Humble Oil & Refining Co. 2-H Mestina, Share 2, San Antonio de Baluarte Grant, A-276. IP 39.50 BOPD (net), 28 per cent water, ¼-in., GOR 1,415 cu. ft. per barrel, perfs. 6,151-56 ft. (Yegua). TD 6,400 ft. (New pay in Coyote field.)

Jim Wells County: Rand Morgan 2-K Fee, Lot 3, Sec. 9, Ragland Farm Tracts (3 miles northeast of Alfred). IP 123 BOPD, 7/64-in., 41.2°, GOR 307 cu. ft. per barrel, TP 675 psi., perfs. 5,304-07 ft. (Vicksburg—Upper McNeil). TD 5,742 ft. (New field.)

Jim Wells County: Skinner Corp. et al 1 Johnson, Lot 39, Hancock, Loving, and Roby Subd., Los Presenos de Arriba Grant, A-148. IP 58 BOPD (net), 52.5 per cent water, ¼-in., 38.7°, GOR 832 cu. ft. per barrel, TP 100 psi., perfs. 4,881-84. TD 5,414 ft. (New field—Word.)

Hugo Allen and McBride, Inc., 1 Nina Adams Estate, Los Presenos Grant, A-281 5 miles southeast of Alice. IP 127 BOPD, ⅛-in., 32.6°, GOR 301 cu.


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ft. per barrel, TP 570 psi, perfs. 5,406-09 ft. (Vicksburg) TD 6,014 ft. (New field—1 mile north of North Magnolia field.

Starr County: V. F. Neuhaus 1-A Don Cameron et al Unit, Sec. 487 (24 miles northeast of Rio Grande City). IP 18,000 M.c.f. daily, absolute open-flow potential, GLR 69.2 M.c.f. per barrel, 64.2°, shut-in TP 2,473 psi., perfs. 6,452-73 ft. (Vicksburg). TD 7,503 ft. (New pay in Yzaguirre field.)

Starr County: Shell Oil Co. 6 Garza-State, Sec. 218, E. Rangel Sur. IP 141.06 BOPD, 5/32-in., 44°, GOR 745 cu. ft. per barrel, TP 550 psi., pe fs. 5,688-93 ft. (Frio, and (dual completion) 128.45 BOPD, 5/32-in., 45°, GOR 911 cu. ft. per barrel, CP 815 psi., perfs. 5,710-15 ft. (Frio). TD 6,525 ft. (New pays in North Rincon field.)

Shell Oil Co. 1 Thomas, Sec. 547, CCSD&RGNG Sur., A-384. IP 70,000 M.c.f. daily, absolute open-flow potential, GLR 37.8 M.c.f. per barrel, 54.9°, shut-in TP 4,253 psi., perfs. 7,431-36 ft. (Vicksburg). TD 10,005 ft. (New pay in North Rincon field.)

Wood B.others & Langham 2-B Phillips Wardner Trust, Share 34, Porcion 84. IPP 22.6 BOPD (net), 50 per cent water, 19.3°, perfs. 1,612-16 ft. (Frio). TD 1,835 ft. (New pay in El Tanque field.)

Webb County: Killam & Hurd 1-54 A. M. Bruni Estate, Blk. 54, Brown Subd., Share 6, Las Albercas Grant (1 mile east of Glen). IP 2,000 M.c.f. daily, absolute open-flow potential, dry gas, shut-in TP 865 psi., perfs. 2,645-55 ft. (New field, 1 mile northwest of Albercas field.)

Zavala County: San Miguel Lease & Royalty Co. 1 Matthews, Sec. 8, Precilla Graham Sur., A-753 (5 miles southwest of La Pryor). IPP 11.62 BOPD (net), 40 per cent water, 19°, GOR 150 cu. ft. per barrel, perfs. 2,761-67 ft. (San Miguel). TD 2,900 ft. (New field.)

W. H. McGarr 1 Bartlett, Patrick C. Jack Sur., A-499. IP 2,600 M.c.f. daily, absolute open-flow potential, dry gas, shut-in TP 1,150 psi., perfs. 2,688-74 ft. (Navarro-Olmos). TD 3,040 ft. (New field—4 miles southwest of Batesville.)

### TEXAS GULF COAST

Colorado County: Ginther, Warren & Ginther 1 J. P. Coleman et al Unit, 3 miles northeast of Rock Island in

Hardin County: Sinclair Oil & Gas Co. 1-T L. L. Williams et al, Jas. Rafferty Lge., A-45, 8 miles north of Silsbee. IPF 165 BOPD, 9/64-in. choke, 42.4°. 7-A Yegua 7,365-69 ft. TD 7,852 ft. New oil pay at North Silsbee.

Harris County: Robinson Oil & Gas Co. 1 Jessie E. Fleming, 6½ miles northwest of Webster, W. D. C. Hall Sur. A-23,660, ¾ mile northwest of oil production in Webster (Friendswood field). IPF 60,000 M.c.f. of gas per day, GLR 21,310:1. 9,066-70 ft., 9,074-76 ft. 59.9°. TD 9,200 ft. New gas-distillate pay at Webster (Friendswood) field.

Lavaca County: H. L. Hawkins 1 Robertson, Sarah Williams Sur. (6 miles west of Speaks). IP 3,900 M.c.f. daily, absolute open-flow potential, GLR 278 M.c.f. per barrel, 51°, shut-in TP 3,164 psi., perfs. 9,106-30 ft. (Wilcox). TD 9,590 ft. (Extends and opens new reservoir for Southwest Speaks field—1 mile northeast of produtcion.)

Liberty County: Mills Bennett Estate 1 Anselin-Babcock, Lot 12, T&NO Farm Lot Subd., West Liberty Town League, A-357. IP 114.80 BOPD, XX-32 choke, 36.2°, GOR 373 cu. ft. per barrel, TP 630 psi., perfs. 8,455-61 ft. (Palmer sand). TD 8,981 ft. (New reservoir ¾ mile south of Martha field—South Martha.)

Live Oak County: Coastal Trend Oil & Gas Corp. 1 Wilson, Lot 50, Kittie Block, George West Ranch Subd., Seth Carry Sur., A-136. IP 12,000 M.c.f. daily, absolute open-flow potential, dry gas, shut-in TP 773 psi., perfs. 1,841-45 ft. (Hockley). TD 2,707 ft. (New field—2½ miles south of Three Rivers.)

Manor Oil Co. and Elms & Eckert 1 Striebeck Jr., Sec. 219, AB&M Sur. (12 miles southwest of George West). IP 8,600 M.c.f. daily, absolute open-flow potential, GLR 60.69 M.c.f. per barrel, 56.6°, shut-in TP 2,595 psi., perfs. 7,068-72 ft. (lower Wilcox-Slick sand), and (dual completion) 30,000 M.c.f. daily, GLR 57.85 M.c.f. per barrel, 57°, shut-in TP 2,552 psi., perfs. 6,968-7,018 ft. (upper Wilcox-Slick sand). TD 7,430 ft. (New field—1 mile southeast of Texam field.)

Matagorda County: Arkansas Fuel Corp. 1 State Tract 174, Matagorda Bay (8¾ miles northeast of Port O'Connor). IP 4,100 M.c.f. daily, absolute open-flow potential, dry gas, shut-in TP 1,935 psi., perfs. 4,886-91 ft. (Miocene). TD 5,815 ft. (New pay and extension, Matagorda Bay field.)

S.A.&M.G. RR Sur. 24. IPF 8,400 M.c.f. of gas per day plus 48.72 BD per M.M.c.f. of gas. 9,915-27 ft. TD 10,015 ft.

Wharton County: Robinson Oil & Gas Co. and Downey Bros. 1 C. L. Tucker, 4 miles northwest of Louise, S. P.

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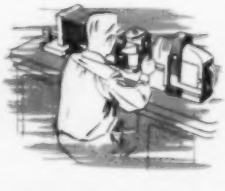

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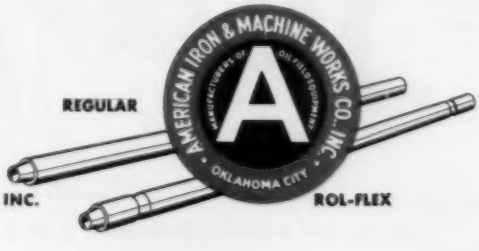


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Middleton Sur. A-269. IPF Shut in gas well. 4,424-30 ft. TD 5,188 ft. New gas discovery.

### WEST CENTRAL TEXAS

Callahan County: Louis J. Topton et al 1 Lucy Whitehead, Sec. 17, BBB&C Sur., 2 miles north Denton. IPP 23.5 BOPD, 40°, GOR 350, Hope sand 1,706-17 ft. TD 1,807 ft.

Coleman County: Dot Corp. 1 W. Helm, Sec. 9, T&NO Sur., 1 mile west Glen Cove. IP 1,000 M.c.f. gas, open tubing, pay 1,989-90 ft. TD 2,045 ft.

Lone Star Producing Co. 1-A Hudson, Sec. 74, GH&H Sur., 3½ miles northeast Novice. IP 200 BOPD, 20/64-in., 42.8°, GOR 2737, TP 200 psi., Caddo 3,719-25 ft., TD 3,880 ft.

S. B. Roberts 1 S. T. White (formerly V & J Production Co.), 23-2-ETRR, 5 miles northeast Pioneer. IP 168 BOPD, ¼-in., 42°, GOR 1050, TP 485 psi., Caddo 2,519 ft. TD 2,521 ft.

Eastland County: Fred A. Kadane, Jr. 1 George P. Fee, Sec. 76 Blk. 4, H&TC, 2 mi. NE Cisco. IP 145 BOPD, 14/64-in., TP 400 psi., 44°, GOR 1240, Lake sand 3,365-69 ft., TD 4,077 ft.

Nolan County: Champlin Oil & Refining Co. et al 1 Beckham, 2-X-T&P Sur., 6 miles southwest Trent. Dual discovery. IP from perfs. 5,447-79 ft., pumped 128 BOPD, 45°, GOR 475. Ellenburger IP 205 BOPD, ⅜-in. choke, 47°, GOR 570, TP 210 psi., perfs. 6,183-6,255 ft. TD 6,335 ft., elev. 2,522 ft.

Shackelford County: Jim B. Curry et al 1 Swenson, W. S. Keaghey Sur. 2, 2 miles north Lueders. IPP 97 BOPD, 37°, GOR 370, Tannehill 1,463-73 ft. TD 1,550 ft.

Stephens County: Woodley Petroleum Co. 4 G. W. Thorpe, Sec. 456, SPRR Sur., 9 miles northeast Cisco. IP 648,000 cu. ft. gas, open flow, perfs. 1,906-10 ft. TD 2,400 ft.

Throckmorton County: G. G. Glasscock and Tidelands Oil Co. 1 Kay, Sec. 3031, TE&L Sur., 6 mi. NE Throckmorton. IP 295 BOPD' 20/64-in., 41°, GOR 750, TP 235 psi., perforations 4,820-89 ft. TD 4,889 ft.

### WESTERN NEBRASKA

Cheyenne County: Ohio Oil Co. 1 Hawkins, C SW NE 17-12n-51w. IP 2,700 M.c.f. of gas per day, "D" sand 5,039-43 ft. TD 5,215 ft. New pool.

Kimball County: Shoreline Petroleum Co. 2 Hyson, 5-13n-55w. IPP 150 BOPD, "D" sand 6,266-72 ft., 6,274-82 ft. TD 6,455 ft. New pool.

### WEST TEXAS

Concho County: Pan American Petroleum Corp. 2 Henderson, 24-8-H&TC, 15 miles southwest Eden. IP 9,300 M.c.f. gas, Goen sand 4,402 ft. TD 4,460 ft. Shut in TP 1,250 psi.

Ector County: Frank Waters Oil Co. 1 Josie Fay Peck, 2-42-T4S-T&P, 15 miles south Odessa. Recompletion. IPP 93 BOPD, 33°, Queen sand 4,486-4,609 ft. TD 4,660 ft.

Upton County: Hunt Oil Co. 1-67 Amacker "B," 67-C-CCSD&RGNG, 10 miles northwest Rankin. IP 5,000 M.c.f. gas, calculated open-flow, GLR 29,000:1, 58° condensate, Strawn perfs. 10,382-88 ft. Shut in pressure 2,992 psi. TD 12,900 ft.

Ward County: W. A. Moncrief 1 Pitzer, 114-34-H&TC, 7½ miles southwest Pyote. IP 2,100 M.c.f. gas, calculated open-flow, Delaware 6,085-6,105 ft. TD 8,400 ft., PB 6,315 ft.

### WYOMING

Fremont County: Phillips Petroleum Co. and Carter Oil Co. 1 Dry Creek "A," C SW NE 27-6n-3w. IPF 2,010 BOPD, 39 and 34.9°. Phosphoria 4,640-90 ft., Curtis 3,384-3,408 ft., 3,415-27 ft., 3,434-50 ft. TD 5,705 ft. Opens Rolff Lake field.

The California Co. 1 Spratt, SE 5-38n-90w. IP 8,275 M.c.f. of gas per day, 106 B. W. Lance 8,934-48 ft., 8,793-8,809 ft. TD 8,990 ft. Opens Lost Cabin field.

Natrona County: Pan American and Lion Oil Co. 2 Unit, 4-40n-77w. IPF 515 BOPD, 56°, 3,240 M.c.f. of gas per day. Frontier 9,534-48 ft. TD 11,015 ft. New pay in Sherwood field.

Park County: Mule Creek Oil Co. 1 State, 16-47n-102w. IPP 92 BOPD, 7 per cent water, 14.9°. Phosphoria 3,644-62 ft. TD 4,150 ft. Opens Sheep Point field.

Crook County: True Oil Co. 2 S. L. Koch, 20-49n-68w. IPF 500 BOPD, 40.8°. Dakota 6,504-20 ft. TD 6,580 ft. New field.

### UTAH

Grand County: Oil, Inc. C-2 Federal, 18-17s-24e. IP 728 M.c.f. of gas per day. Castlegate 765-817 ft. TD 817 ft. New pay in Westwater pool.

Pure Oil Co. 1 Federal, 14-26s-19e. IPF 319 BOPD, 44°, Miss. 7,694-7,728 ft. TD 7,954 ft.

San Juan County: Reynolds Mining Co. 1 Federal, 51-38s-24e. IPF 733 BOPD, 42.2°. Paradox 5,967-87 ft. TD 6,049 ft. New pool.

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# Unruh Inherits Expansion Job

## . . . as Sinclair Pipe Line president. This energetic and dynamic young pipeliner is keeping on the run these days.

EARL W. UNRUH has found there's not too much difference in being president of Sinclair Pipe Line Co. than being its vice president for operations.

One of his main tasks in both spots is to oversee the thorough modernization program begun by his predecessors.

Sinclair's system of wholly and partially owned lines is one of the world's biggest—some 24,000 miles. The system has been undergoing an overhauling since World War II. Unruh had a role in the planning and early construction stages of this work. His job now is to see the job through to completion.

EARL W. UNRUH
. . . imagination comes in handy.

**A busy man . . .** Unruh spends a lot of time on the road these days.

He has to keep moving to cover the territory served by the Sinclair pipeline system. This region stretches from the Rockies to the Atlantic and from the Gulf of Mexico to Canada.

But keeping on the move is nothing new to this energetic, decisive, and articulate executive. He did the same as vice president in 1956 and has kept up the pace since becoming president last spring.

Almost all of Unruh's career in oil has been spent in pipelining.

Unruh earned his bachelor of arts degree in chemistry at Bethel College, Newton, Kans., and then went on to the University of Tulsa. There he gained a degree in chemical engineering.

While at Tulsa, he did summer work with Carter Oil Co. and later with Sinclair Prairie Oil Co. After graduation, he went to work permanently in the Sinclair organization.

He was transferred to Sinclair Refining Co.'s pipeline division in 1941. At that time the company was building its first major products line, the one now being supplanted by the Laurel line, which runs from Philadelphia to Cleveland. He helped supervise the planning and design work on the new line, and a year later was named chief dispatcher. This was pretty much a nighttime job. So Unruh dispatched by night and continued planning and designing other lines by day.

Unruh was made chief engineer of products lines in 1943. His headquarters were in Columbus, Ohio, when the company completed the Chicago-Toledo link that tied the Marcus Hook-to-Chicago and Texas-to-Chicago systems into one. He moved to Sinclair pipeline headquarters at Independence, Kans., in 1948 when the first of a series of moves to consolidate all Sinclair pipeline operations was made. In 1949 he became chief engineer of both crude and products lines.

The transfer to Independence was like going back home. Unruh was born in Newton, Kans., and reared in Halstead where he attended both elementary and high school. His home now is 3001 North Lakeview Lane on the outskirts of Independence, an easy 4 minutes from the office. He and Mrs. Unruh have three children, two daughters and a son.

**Into administration . . .** Unruh attended the advanced management program of Harvard's school of business administration in the spring of 1953.

It was a timely occurrence, coming just as he was moving from an operating to a primarily administrative capacity. He has a high regard for the Harvard course and describes his experience there as "wonderful."

His first administrative job was as part-interest executive. At the time Sinclair was joining with other companies in a number of ventures. Unruh's job was to look after the company's interests in these dealings. They included the Platte, Texas-New Mexico, Arapahoe, Badger, Pioneer, and other pipelines.

Unruh moved up to operations vice president in 1956 and the next year became president of the pipeline system.

**What he's like . . .** Unruh belongs to the school of management that believes in delegating responsibility.

Intimates report he's not one to keep an entire operation under his thumb and to prevent men under him from making decisions until they can call a conference.

Unruh, however, is known as an imaginative executive, a good man with whom to work out a problem. That's because he has the knack of quickly understanding a complete problem and its implications.

Key to Unruh's personality is his genuine interest and concern for others. That also explains why he commands such a fierce loyalty from his associates.

## Personals

**James W. Chism,** Shell Oil Co. geologist, has transferred to Oklahoma City from Dumas, Tex.

**Willard L. Roy** has left Shoreline Petroleum Corp., where he was project engineer in Kimball, Neb., to join American Climax Petroleum Corp. as district engineer in Coleman, Tex.

**R. Paul Henry,** financial vice president of D-X Sunray Oil Co., has been elected financial vice president for the parent Sunray Mid-Continent Oil Co. He will continue in the same capacity with D-X Sunray.

**John R. Van Slyke,** formerly with Barnett Oil Co., has opened offices in Wichita as consulting petroleum engineer. He was with Magnolia Petroleum Co. as division petroleum engineer before joining Barnett in 1951.

**Arthur W. Langer, Jr.,** has been named a section head in the chemical research division of Esso Research & Engineering Co. He has been with the company since 1951.

**Robert E. Pulver** has been elected a director of Standard-Vacuum Refining Corp. (Philippines), subsidiary of Standard-Vacuum Oil Co. Pulver will be manager of the company's Bataan refinery project in the Philippines.

BUCHANAN ATWATER MORLEY WENGERD

# Husky Oil's Buchanan Will Head AAPG

GEORGE S. BUCHANAN, vice president and a director of Husky Oil Co., has been elected forty-second president of American Association of Petroleum Geologists succeeding Graham B. Moody, Berkeley, Calif., consultant. Buchanan will take over March 13 at the close of the association's annual meeting.

Gordon I. Atwater, senior member of Atwater, Cowan & Associates, New Orleans, has been elected vice president of AAPG. Harold T. Morley, chief geologist for Pan American Petroleum Corp. is newly elected secretary-treasurer. Serving on the executive committee with Buchanan, Moody, Atwater, and Morley will be Sherman A. Wengerd, professor of geology at the University of New Mexico and present editor of the AAPG monthly bulletin.

Buchanan, new president of the 14,000-member association, has been with Husky since 1953. He was president and a director of Yegua Corp. in Houston and vice president of Sohio Petroleum Co. before that time.

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**John S. Baker** has resigned as geologist for Skelly Oil Co. in Albuquerque to open an exploration office for Kern County Land Co. there.

**Patrick N. Glover,** Shell Oil Co. geologist in the Denver area, has been promoted to Denver division exploration manager. He succeeds **Paul W. Fairchild,** recently named area geologist.

**William Hall,** Standard Oil Co. (Ind.), has been elected president of the Wichita Oil Men's Club. Other officers are **Kenneth Edminister,** Shamrock Oil & Refining Co., vice president; **Harold Johnson,** Killion Oil Co., and **W. W. Lierman,** Sunray Mid-Continent Oil Co., directors.

**Ralph P. Paden,** formerly assistant manager of Atlantic Refining Co.'s crude-oil pipeline department at Dallas, has been named manager of the department's technical section. **Winfield S. Schmidt** has been promoted by the company from assistant manager of its products pipeline department at Philadelphia to manager of the crude-lines department's operations section at Dallas. Paden joined Atlantic in 1933 as a station engineer and was general superintendent of the crude-lines department before being promoted to assistant manager in 1946. Schmidt joined the company in 1917. He was named assistant manager of the products-line department in September 1957.

**J. B. Brooke,** drilling superintendent for Travis Drillers, has been transferred to Big Spring, Tex., from Austin.

**B. R. Putnam, Jr.,** has been appointed manager of the petrochemicals department of American Cyanamid Co.'s organic chemicals division. Putnam has been with the company since 1947.

**Weldon C. Butler,** district engineer with Carter Oil Co. in Great Bend, Kans., has joined Arabian American Oil Co. in New York as drilling-equipment engineer.

**John H. Smith,** formerly project engineer, has been appointed chief design coordinator in Sun Oil Co.'s manufacturing engineering division. **Fulton K. Niece,** assistant project engineer, moves up to succeed Smith. **H. George Shimp,** assistant process engineer, will replace Niece.

**C. E. Reistle, Jr.,** executive vice president of Humble Oil & Refining Co., has been named Engineer of the Year by the San Jacinto chapter of Texas Society of Professional Engineers. The award will be presented February 21 in Houston. In November Reistle was named to receive the Anthony F. Lucas Gold Medal of American Institute of Mining, Metallurgical, and Petroleum Engineers. The Lucas award will be made February 19 at AIME's annual meeting.

## Personals

**O. L. Lewis** has joined Ehrhart & Associates, Inc., Los Angeles, as chief engineer.

**Cody Spencer,** president of General Petroleums of Canada, Ltd., New Superior Oils of Canada, Ltd., and Altex Oils, Ltd., has been appointed president of Kroy Oils, Ltd.

**C. L. Evans,** area superintendent for Sun Oil Co. in Morgan City, La., has been promoted to assistant regional superintendent in Lafayette, La.

**Oliva John Karna** has been assigned to Mantova, Italy, by Lummus Co. to assist in startup of Soc. Edison's new ethylene plant there. He has been technical adviser and instructor for Lummus to Naste Oy, Naantali, Finland, for the past 2 years.

**Charles H. Braithwaite,** formerly with Food Machinery & Chemical Corp., has joined Productol Co., Santa Fe Springs, Calif., as research and development director. Productol is a manufacturer of petroleum based phenol, cresols, and xylenols.

**Raymond F. Hadley,** chief engineer of Sun Pipe Line Co.'s products-lines department since 1954, has been elected a vice president. Hadley has been with Sun and its subsidiaries since 1931. A graduate of Rensselaer Polytechnic Institute, Troy, N. Y., he received the American Gas Association's Beal Medal in 1940 for his research in corrosion control.

**Edgar Kraus,** former manager of Atlantic Refining Co.'s exploration department at Dallas, has been named assistant general manager of the company's production department and will move on up to general manager of the department when **J. N. Mendenhall** retires within the next few months. **William B. Moore,** manager of Atlantic's South Louisiana operating region at Lafayette, La., will replace Kraus as exploration department head at Dallas. **Louis F. Davis,** manager of the Oklahoma-Kansas region at Tulsa, has been named regional division manager at Dallas. As such, he will be charged with coordinating activities of Atlantic's six operating regions.

## Personals

HENRY FLYNN

**Henry Flynn,** general superintendent of The Texas Co.'s Port Arthur, Tex., refinery, has moved up to manager there. He succeeds **F. L. Wallace,** who has retired. **E. W. McNealy,** assistant general superintendent of the refinery, will replace Flynn as general superintendent. Flynn had been general superintendent at Port Arthur, Texaco's largest refinery, since 1956. He joined the company in 1927. McNealy was superintendent at the Eagle Point, N. J., and Lockport, Ill., works, before assisgnment to Port Arthur last year.

**G. A. Van Wielingen,** formerly vice president and general manager of Progas, Ltd., has joined J. C. Sproule & Associates, Calgary consulting firm, as head of the company's new gas engineering department.

**James E. Owens** has been promoted by Sohio Petroleum Co. from staff assistant to the Gulf Coast division manager in Houston, to gas superintendent of the division. He will continue to headquarter in Houston.

**H. F. (Hank) Mogg,** general superintendent, and **Mike Finnerty,** superintendent, Bechtel Corp., have been assigned to direct construction of a 47-mile, 30-in. section from Rib Lake, Ont., to Tilden Lake, Ont., under contract to Trans-Canada Pipe Lines, Ltd.

**Frank H. Stone,** manager of the natural gas and gasoline department of La Gloria Oil & Gas Co., has been named a vice president of the company. Stone will direct all La Gloria processing activities, including operations of the gas-processing plant at Falfurrias, Tex., and the refinery at Tyler, Tex.

**E. J. Karle,** general superintendent at California Oil Co.'s Perth Amboy, N. J., refinery, has been named manager of operations. He replaces **R. H. Rowland,** refinery manager for the past 5 years, who has been transferred to San Francisco. **W. R. Forsythe** replaces Karle as general superintendent. In other changes, **A. H. Waldchen** has been named superintendent, catalytic operations; **C. V. Shireman,** superintendent, manufacturing and utilities; **W. R. Gentry,** superintendent, oil movement and security; and **D. B. Edmondo,** superintendent, planning.

**J. Gregory Harrison,** assistant engineer at The Texas Co.'s Eagle Point refinery, Westville, N. J., has been promoted to engineer in the plant engineering department.

**Edward L. Bishop** has joined Brown & Root, Inc., as project development engineer in Houston. Bishop was formerly with Ralph M. Parsons Co., Los Angeles.

**L. W. MacNaughton,** board chairman of DeGolyer & MacNaughton, has been elected a director of Dresser Industries, Inc. MacNaughton and the late Everette DeGolyer formed their widely-known consulting firm in 1939.

**H. J. Brunt,** assistant production division superintendent for Ohio Oil Co. at Casper, Wyo., has moved up to superintendent. He replaces **Michael J. Boyce,** who has retired after 44 years with the company.

**Perry E. Barnhart,** district geologist in Midland, Tex., for Cities Service Oil Co., has been appointed Lafayette, La., district geologist. He succeeds **B. C. McCasland,** who has been given a foreign assignment. **Bill James,** staff geologist in Midland, will replace Barnhart as district geologist there.

W. F. BATES

**W. F. Bates** has moved up from assistant to Shell Oil Co.'s Pacific Coast area vice president to Pacific Coast area production manager. He succeeds **B. P. Eastin,** who has been appointed manager of production research for Shell Development Co.'s exploration and production research division in Houston. Bates was Ventura, Calif., division production manager before being named assistant to the area vice president.

**C. T. Jones** has been promoted to technical specialist in the technical-service division at Humble Oil & Refining Co.'s Baytown, Tex., refinery.

**Robert M. Morgan,** drilling and production farm boss for Amerada Petroleum Corp. in Tioga, N. D., and Waterford City, N. D., has been promoted to foreman and transferred to Belfield, N. D.

### Andreason Heads New York Nomads

New York chapter of Nomads has named E. E. Andreason, seated, second from left, Andreason-Lundberg Corp., to head its slate of 1958 officers. Others are, first row, left to right, Herb E. Maland, R. J. Eiche & Associates, Inc., senior regent; Andreason; Don E. Kircher, Gardner-Denver Co., vice president; Maurice F. Delano, Jr., R. S. Stokvis & Sons, Inc., junior regent. Standing, left to right, E. W. Hoeppner, Hughes Tool Co., executive secretary; John E. George, Mid-Continent Supply Co., assistant secretary; Harold E. Lowrey, Continental-Emsco Co., sergeant-at-arms; and W. E. Volkman, Cardwell Manufacturing Co., treasurer. Not pictured are R. L. LeBus, Jr., Baash-Ross Tool Co., assistant treasurer; Hollis W. Halton, Beckley, Halton & Hickman, secretary; and D. T. O'Connor, D. T. O'Connor Co., and J. W. Chando, A. O. Smith Corp., assistant sergeants-at-arms.

## Personals

**G. D. Almen, Jr.,** vice president of Sinclair Oil & Gas Co. and manager of its Houston division, has been transferred to Midland, Tex., as division manager. He succeeds **Floyd Brett,** who has been transferred to the Tulsa division. **T. F. Palmer,** assistant division manager at Houston, has been elected a vice president and will succeed Almen at Houston. **R. M. Kobdish,** assistant Tulsa division manager, transfers to Houston to succeed Palmer. Almen had been Houston division manager since June 1957. He was elected a vice president in 1956. Palmer was named assistant Houston division manager in 1954.

G. D. ALMEN, JR.

T. F. PALMER

**Eugene W. Smith,** regional geologist in Denver for Sun Oil Co., has been transferred to Dallas as staff geologist. **John G. Wells,** Billings, Mont., and **George H. Davis III,** Casper, Wyo., have been transferred to the company's Latin American division. Both are geologists.

**A. P. Coe** has been named by Cities Service Oil Co. to succeed **E. L. Cralle** as production superintendent of the South Odessa, Tex., district. Cralle was recently appointed assistant Odessa division superintendent. **Keith Van Horn,** North Odessa district engineer, will succeed Coe as superintendent of the North Odessa district. **William C. Smith,** engineer in the Odessa area, will replace Van Horn.

**C. R. Corrothers,** Humble Pipe Line Co., has been elected president of the Gulf States chapter of American Right of Way Association. Association vice presidents are **Glen F. Graves,** Trunkline Gas Co., Houston; **J. R. Ball,** Magnolia Pipe Line Co., Dallas; **Paul E. Lirette,** Louisiana Department of Highways, Baton Rouge; **William F. Howard,** El Paso Natural Gas Co., El Paso; and **Hood Kizziar,** Texas Pipe Line Co., Houston. **Charles B. Runnels,** Tennessee Gas Transmission Corp., Houston, has been elected secretary, and **W. B. Thornton,** Houston Lighting & Power Co., Houston, is treasurer.

**Paul Fink** has been appointed chief mechanical engineer for Peoples Natural Gas Co. He has been with the company since 1951.

**Robert L. Breedlove,** acting chief geologist for the past year for Arkansas Louisiana Gas Co., has been named chief geologist.

**John B. Maughan,** formerly Edmonton division reservoir engineer for Pan American Petroleum Corp., has joined J. C. Sproule & Associates, Calgary consulting firm, as head of the petroleum engineering and reservoir section.

**Bob Schrage,** head of the applied mathematics section at Esso Standard Oil Co.'s Bayway refinery, Linden, N. J., has been promoted to assistant manager of the technical service division. In other appointments, **John McKenna,** group head in refinery planning coordination at Bayway, becomes section head in fuel and chemical products division. **Bill Ward,** group head of special products economic coordination, has been promoted to section head in specialty products.

**W. B. Reynolds** has been promoted to director of research for Phillips Petroleum Co. He was formerly assistant director and succeeds **J. A. Reid** in the top post. Reid was recently named executive vice president and general manager of Astrodyne, Inc., new solid fuel, rocket engine company organized by Phillips and North American Aviation, Inc. **D. E. Carr,** an assistant director of research for combustion and lubrication work, becomes assistant director for all Phillips research activities. **F. E. Frey** and **T. W. Legatski,** formerly assistant research directors, have been named associate directors.

W. B. REYNOLDS

**D. J. Johnson** has been named exploration superintendent and division manager at Pasotex Petroleum Co.'s new division exploration office in Oklahoma City. **K. R. Gilleland** will be division geophysicist there with **D. C. Cedarleaf** as division staff geologist and **L. B. Gatewood** as division landman.

## DEATHS

**Griffin Alexander Long,** 72, Morris, Okla., drilling contractor, died January 29 in Okmulgee, Okla., after suffering severe burns. Long was injured while working at a lease near Morris.

**Frank J. Storm, Sr.,** 85, one of the founders of the old Amarillo Oil Co. and Amarillo Gas Co., died recently in Amarillo. Storm was a pioneer in oil and gas development in the Texas Panhandle. He drilled the discovery well for Panhandle field in 1918. His son, **Frank Storm, Jr.,** is a partner in Storm, Hagy & Herrmann, Amarillo.

**Norman Andrew Chaffin,** 66, retired foreman for Associated Oil Co., died January 27 in Bakersfield, Calif.

**Robert E. Wheatley,** 39, Houston, vice president of Tom Wheatley Co., oil-field supply firm, was killed January 28 in an auto accident near DeQuincy, La.

**Thomas P. Butler,** 68, chairman of the board of Heyl & Patterson, Inc., Pittsburgh, died January 29 after a 3-month illness.

**John W. Naylor,** 62, independent operator and former oil editor of the Fort Worth Star-Telegram, died January 31 in Fort Worth. Naylor was a brigadier general in the Texas National Guard.

**B. F. Wiley,** geologist with Humble Oil & Refining Co., **J. A. Ledet** and **F. W. Bergeron,** of Rowan Drilling Co., and **E. E. Eskridge,** pilot, were killed when a helicopter returning from a Humble offshore rig crashed February 1 in the Gulf of Mexico.

**Milton M. Brown,** 44, drilling superintendent for R. L. Manning Drilling Co., Denver; his assistant, **E. R. Hetland,** 40, and a company pilot, **J. A. Johnston,** 44, were killed recently in a plane crash near Bluff, Utah.

**Sam Bennett,** 64, president of St. Francis Oil Co., a partner in King Petroleum Co., and former president of South Belridge Oil Co., died February 3 in Los Angeles.

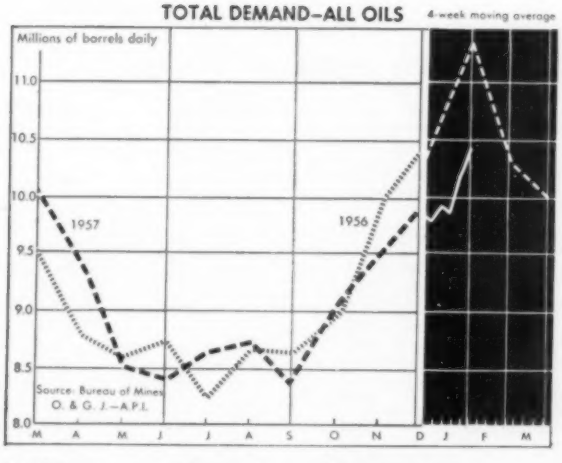
**Irving Boyd Hamilton,** 39, chief paleontologist of Sun Oil Co. at Dallas, died February 3 in a Dallas hospital. Hamilton had been with Sun in Dallas for 16 years.

**Herbert C. Stockham, Sr.,** chairman of the board of Stockham Valves & Fittings, died January 24.

# Latest Figures . . . Industry Trends

## A QUICK LOOK AT THE HIGHLIGHTS

| | LATEST WEEK | Change from WEEK AGO | | Change from YEAR AGO | |
|---|---|---|---|---|---|
| Production | 6,834,875 | DOWN | 91,460 | DOWN | 659,529 |
| Crude stocks | 276,882,000 | DOWN | 183,000 | UP | 22,692,000 |
| Completions | 1,000 | UP | 41 | DOWN | 73 |
| Refinery runs | 7,548,000 | DOWN | 91,000 | DOWN | 654,000 |
| Gasoline stocks | 204,559,000 | UP | 1,303,000 | UP | 8,208,000 |
| Kerosine stocks | 23,179,000 | DOWN | 872,000 | DOWN | 1,443,000 |
| Distillate stocks | 123,121,000 | DOWN | 5,060,000 | UP | 22,752,000 |
| Residual stocks | 57,502,000 | DOWN | 308,000 | UP | 19,290,000 |
| Four-product stocks | 408,361,000 | DOWN | 4,937,000 | UP | 48,807,000 |
| Total imports | 1,778,900 | UP | 188,100 | UP | 370,300 |




## Refiners cut formal product price quotations, but discounts continue

LOWER CRUDE PRICES wouldn't help refiners very much at this time. In the mad scramble for gasoline and heating-oil sales, lower crude prices would be followed by lower product prices. Refiners' margins would be right back where they are now.

Some market observers believe that the recent push to move products even at lower prices can be charged to the softening trend in the crude market. Crude-market analysts contend that local reductions in crude prices over the past few months have been due to weak product markets as well as to inequalities within the crude market itself. Both are probably only half right.

When product demands fail to reach expected levels and stocks continue to increase, both crude and product markets soften. The diagnosis is simple; too much new supply for current demands. The prescribed medicine is bitter; cut both the supply of crude and refinery runs. The cuts must be large enough to produce abnormal reductions in crude and product stocks.

At this time of the year, gasoline stocks are increasing and fuel stocks are dropping. Stocks of the four major products decreased a little over 20,000,000 bbl. for the 4-week period ended January 24. That reduction would be good in a normal year, but it was not enough to make much correction in the overall stock position. And, the product stock level needs to be lowered. Here's why:

At the end of January, four-product stocks were up 47,665,000 bbl. over last year. Stocks at the end of January 1957 were 31,000,000 bbl. above 1956. A net gain of only 6,000,000 bbl. was reported for the 2-year period ended January 1956. But, this small gain was necessary to offset the 50,000,000-bbl. increase for the 2-year period ended January 1954.

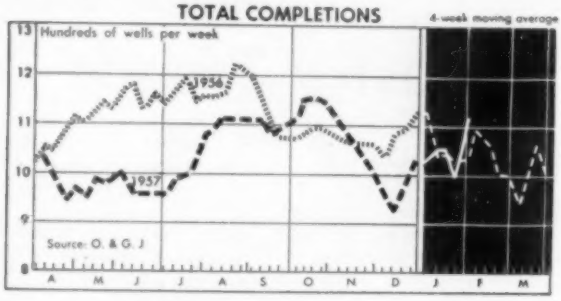
Since the end of January 1952, four-product stock total has moved up 49.3 per cent. Total demand for these products has shown a gain of only 17.1 per cent for the same period.

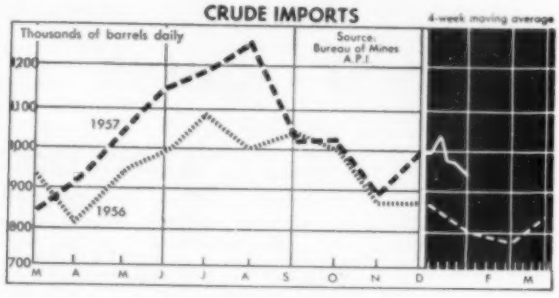
Over the past few weeks refiners have been lowering so-called posted prices to bring them a little more in line with past prices on spot sales.

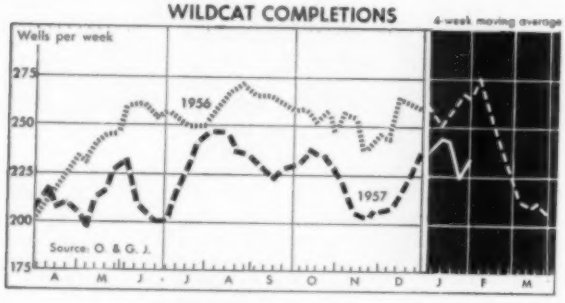
On the East Coast Esso Standard Oil Co. removed all voluntary allowances and discounts from No. 2 fuel, kerosine, and diesel fuel and then reduced prices. The new net barge price for No. 2 fuel in New York Harbor is 9.85 cents a gallon.

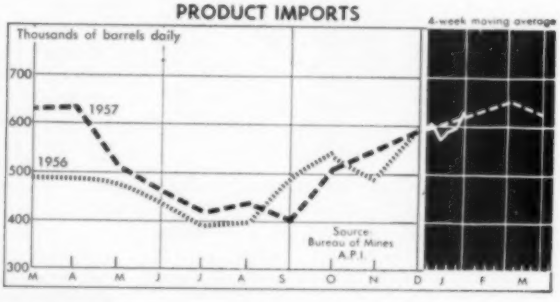
Formal quotations for No. 2 and kerosine on the Gulf Coast were lowered to 8.50 and 8.75 cents, respectively. However, material is available at prices up to 0.5 cent off the new quotations.

Refiners posted new lower prices for light fuels in the Mid-Continent. Discounts off the new postings are not quite as large as they were under the old price, but distillate is a little lower than it was last week.



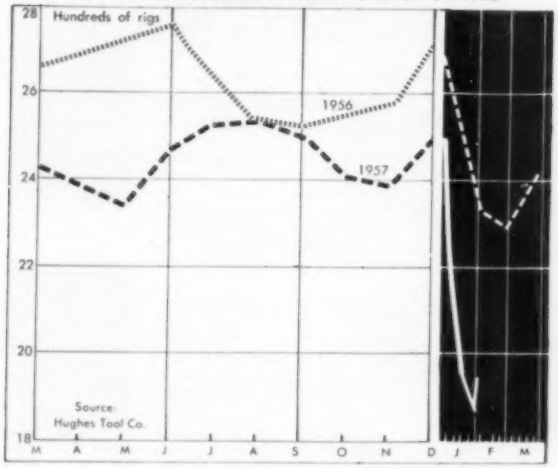




## WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 1, 1958

| | Total wells | | | | | | | Cumulative | | Total wildcats | | | | | Cumulative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Crude | Cond. | Gas | Dry | Service | Footage | 1958 | 1957 | Total | Crude | Cond. | Gas | Dry | 1958 | 1957 |
| Alabama | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 4 | 2 |
| Arkansas | 10 | 5 | 0 | 1 | 4 | 0 | 32,728 | 76 | 122 | 2 | 1 | 0 | 0 | 1 | 15 | 16 |
| California | 37 | 26 | 0 | 0 | 11 | 0 | 183,579 | 200 | 205 | 7 | 1 | 0 | 0 | 6 | 33 | 57 |
| Colorado | 16 | 4 | 0 | 5 | 7 | 0 | 90,506 | 56 | 122 | 9 | 3 | 0 | 0 | 6 | 28 | 86 |
| Illinois | 80 | 35 | 0 | 0 | 45 | 0 | 170,110 | 196 | 249 | 10 | 0 | 0 | 0 | 10 | 43 | 65 |
| Indiana | 10 | 5 | 0 | 0 | 5 | 0 | 13,087 | 70 | 67 | 4 | 0 | 0 | 0 | 4 | 26 | 11 |
| Kansas | 83 | 38 | 0 | 9 | 33 | 3 | 295,939 | 368 | 399 | 10 | 1 | 0 | 0 | 9 | 84 | 84 |
| Kentucky | 30 | 15 | 0 | 5 | 10 | 0 | 43,374 | 103 | 163 | 2 | 1 | 0 | 0 | 1 | 12 | 39 |
| Louisiana | 65 | 31 | 3 | 3 | 28 | 0 | 534,839 | 339 | 363 | 5 | 0 | 0 | 0 | 5 | 46 | 61 |
| North | 25 | 18 | 0 | 1 | 6 | 0 | 105,568 | 118 | 161 | 0 | 0 | 0 | 0 | 0 | 22 | 15 |
| South | 33 | 12 | 3 | 2 | 16 | 0 | 355,468 | 177 | 152 | 2 | 0 | 0 | 0 | 2 | 21 | 41 |
| Offshore | 7 | 1 | 0 | 0 | 6 | 0 | 73,803 | 44 | 50 | 3 | 0 | 0 | 0 | 3 | 3 | 5 |
| Michigan | 8 | 5 | 0 | 1 | 2 | 0 | 22,244 | 30 | 40 | 2 | 0 | 0 | 0 | 2 | 10 | 18 |
| Mississippi | 9 | 4 | 1 | 0 | 4 | 0 | 82,890 | 49 | 23 | 4 | 1 | 0 | 0 | 3 | 26 | 10 |
| Montana | 6 | 4 | 0 | 0 | 2 | 0 | 47,356 | 45 | 40 | 3 | 1 | 0 | 0 | 2 | 24 | 16 |
| Nebraska | 11 | 3 | 0 | 0 | 8 | 0 | 63,854 | 64 | 74 | 5 | 2 | 0 | 0 | 3 | 31 | 47 |
| New Mexico | 42 | 25 | 0 | 11 | 6 | 0 | 198,460 | 237 | 211 | 3 | 1 | 0 | 0 | 2 | 36 | 31 |
| Western | 21 | 7 | 0 | 11 | 3 | 0 | 92,030 | 118 | 83 | 2 | 0 | 0 | 0 | 2 | 17 | 12 |
| Eastern | 21 | 18 | 0 | 0 | 3 | 0 | 106,430 | 119 | 128 | 1 | 1 | 0 | 0 | 0 | 19 | 19 |
| New York | 10 | 5 | 0 | 0 | 0 | 5 | 13,500 | 55 | ... | 0 | 0 | 0 | 0 | 0 | 5 | ... |
| North Dakota | 5 | 3 | 0 | 0 | 2 | 0 | 36,170 | 39 | 28 | 1 | 0 | 0 | 0 | 1 | 15 | 10 |
| Ohio | 18 | 9 | 0 | 5 | 4 | 0 | 39,611 | 80 | 99 | 1 | 0 | 0 | 1 | 0 | 3 | 2 |
| Oklahoma | 136 | 71 | 0 | 7 | 45 | 13 | 416,626 | 734 | 691* | 18 | 1 | 0 | 1 | 16 | 112 | 86 |
| Pennsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | *22 | 0 | 0 | 0 | 0 | 0 | 0 | *5 |
| Texas | 381 | 202 | 12 | 33 | 131 | 3 | 1,600,792 | 1,895 | 2,078 | 78 | 7 | 3 | 2 | 66 | 420 | 633 |
| Dist. 1 | 29 | 5 | 0 | 9 | 15 | 0 | 76,854 | 96 | 104 | 10 | 0 | 0 | 0 | 10 | 35 | 48 |
| Dist. 2 | 13 | 5 | 5 | 0 | 3 | 0 | 93,240 | 64 | 74 | 2 | 0 | 1 | 0 | 1 | 19 | 34 |
| Dist. 3 | 35 | 15 | 4 | 1 | 14 | 1 | 232,494 | 134 | 181 | 3 | 0 | 1 | 0 | 2 | 23 | 58 |
| Dist. 4 | 24 | 14 | 1 | 1 | 8 | 0 | 123,026 | 118 | 140 | 5 | 1 | 0 | 1 | 3 | 43 | 61 |
| East | 20 | 7 | 1 | 0 | 12 | 0 | 86,119 | 138 | 120 | 7 | 0 | 0 | 0 | 7 | 47 | 39 |
| Dist. 7-B | 40 | 10 | 0 | 3 | 27 | 0 | 127,305 | 225 | 294 | 20 | 1 | 0 | 1 | 18 | 73 | 115 |
| West | 105 | 83 | 0 | 1 | 20 | 1 | 452,782 | 570 | 546 | 17 | 3 | 0 | 0 | 14 | 96 | 108 |
| Dist. 9 | 86 | 48 | 0 | 11 | 26 | 1 | 279,530 | 421 | 471 | 11 | 2 | 0 | 0 | 9 | 71 | 150 |
| Dist. 10 | 29 | 15 | 1 | 7 | 6 | 0 | 129,442 | 129 | 148 | 3 | 0 | 1 | 0 | 2 | 13 | 20 |
| Utah | 18 | 14 | 0 | 1 | 3 | 0 | 102,489 | 41 | 15 | 4 | 0 | 0 | 1 | 3 | 9 | 9 |
| West Virginia | 19 | 5 | 0 | 9 | 5 | 0 | 43,520 | 54 | 77 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| Wyoming | 6 | 1 | 0 | 0 | 5 | 0 | 25,962 | 72 | 90 | 5 | 0 | 0 | 0 | 5 | 34 | 31 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 11 | 0 | 0 | 0 | 0 | 0 | 10 | 5 |
| Total U. S. | **1,000** | 510 | 16 | 90 | 360 | 24 | 4,057,636 | 4,825 | 5,191 | **173** | 20 | 3 | 5 | 145 | 1,026 | 1,331 |
| Total prev. week | 959 | 498 | 18 | 78 | 356 | 9 | 3,903,011 | ... | ... | 191 | 18 | 1 | 14 | 158 | ... | ... |
| Cum. 1957 | 4,825 | 2,360 | 113 | 351 | 1,905 | 96 | 20,274,523 | ... | ... | 1,026 | 84 | 12 | 46 | 884 | ... | ... |
| Western Canada | 43 | 28 | 0 | 1 | 14 | 0 | 202,578 | 203 | 139 | 15 | 1 | 0 | 1 | 13 | 61 | 35 |

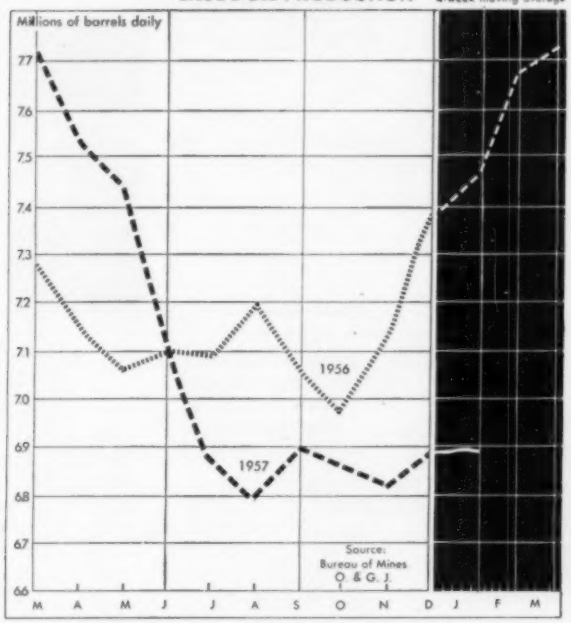
*Includes New York.

## ROTARY RIGS OPERATING IN UNITED STATES




## CRUDE-OIL PRODUCTION

4-week moving average




## ACTIVE ROTARY RIGS*

| | 2-3-58 | 1-27-58 | 1-20-58 | 2-4-57 |
|---|---|---|---|---|
| Alabama | 11 | 9 | 8 | 8 |
| Arkansas | 16 | 15 | 15 | 18 |
| Arizona | 1 | 1 | 1 | .... |
| California | 87 | 89 | 91 | 106 |
| Colorado | 35 | 33 | 33 | 42 |
| Florida | 1 | 1 | 1 | 2 |
| Georgia | .... | .... | .... | .... |
| Idaho | .... | .... | .... | 1 |
| Illinois | 27 | 24 | 38 | 46 |
| Indiana | .... | 1 | 5 | .... |
| Iowa | 3 | 3 | 3 | 1 |
| Kansas | 119 | 104 | 108 | 139 |
| Kentucky | .... | 1 | 4 | 2 |
| Louisiana | 337 | 333 | 341 | 440 |
| North | 32 | 31 | 31 | 36 |
| South | 234 | 231 | 231 | 302 |
| Offshore | 71 | 71 | 74 | 102 |
| Maryland | .... | .... | .... | 1 |
| Michigan | 6 | 7 | 6 | 9 |
| Mississippi | 42 | 41 | 47 | 22 |
| Missouri | .... | .... | .... | .... |
| Montana | 28 | 27 | 29 | 23 |
| Nebraska | 15 | 18 | 20 | 26 |
| Nevada | .... | .... | .... | 1 |
| New Mexico | 109 | 107 | 113 | 120 |
| New York | 1 | 1 | 1 | .... |
| North Dakota | 33 | 40 | 41 | 23 |
| Ohio | 3 | 3 | 2 | .... |
| Oklahoma | 197 | 168 | 190 | 218 |
| Oregon | .... | .... | .... | .... |
| Pennsylvania | 10 | 10 | 8 | 10 |
| South Dakota | 1 | 1 | 1 | .... |
| Texas | 763 | 720 | 750 | 920 |
| Gulf Coast | 158 | 144 | 153 | 206 |
| Offshore | 4 | 5 | 2 | 7 |
| West | 316 | 303 | 306 | 358 |
| North | 247 | 232 | 241 | 297 |
| East | 38 | 36 | 48 | 52 |
| Tennessee | .... | .... | .... | .... |
| Utah | 45 | 47 | 50 | 35 |
| Washington | .... | .... | .... | 1 |
| West Virginia | 4 | 4 | 4 | 2 |
| Wyoming | 53 | 53 | 47 | 48 |
| Virginia | .... | .... | .... | .... |
| Total United States | 1,947 | 1,861 | 1,957 | 2,264 |
| Western Canada | 226 | 221 | 208 | 238 |
| Eastern Canada | 1 | 1 | 1 | .... |
| Grand total | 2,174 | 2,083 | 2,166 | 2,502 |

*Hughes Tool Co.

## DAILY AVERAGE PRODUCTION FOR WEEK

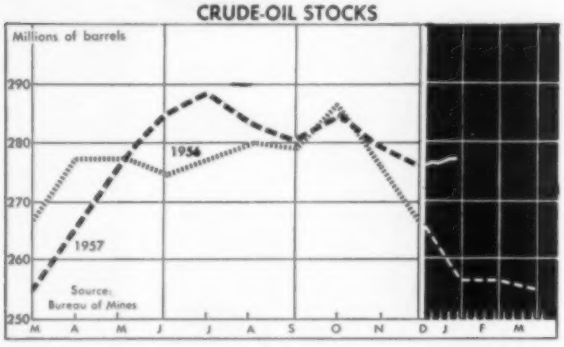
| | February 1, 1958 | | | Jan. 25 |
|---|---|---|---|---|
| | Crude oil | Lease condensate | Total | total |
| Alabama | 15,325 | .... | 15,325 | 15,250 |
| Arkansas | 83,300 | 200 | 83,500 | 82,100 |
| California | 908,500 | .... | 908,500 | 924,300 |
| Colorado | 139,250 | .... | 139,250 | 140,250 |
| Eastern | 51,000 | .... | 51,000 | 51,200 |
| Florida | 1,275 | .... | 1,275 | 1,275 |
| Illinois | 234,200 | .... | 234,200 | 235,900 |
| Indiana | 31,900 | .... | 31,900 | 30,200 |
| Kansas | †328,050 | .... | †328,050 | †349,675 |
| Kentucky | 41,300 | .... | 41,300 | 41,800 |
| Louisiana | 756,150 | 90,100 | 846,250 | 846,350 |
| North | 112,100 | 2,600 | 114,700 | 114,800 |
| South | 644,050 | 87,500 | 731,550 | 731,550 |
| Michigan | 25,800 | .... | 25,800 | 25,300 |
| Mississippi | 101,075 | 4,325 | 105,400 | 105,400 |
| Montana | 74,450 | .... | 74,450 | 74,800 |
| Nebraska | 54,800 | .... | 54,800 | 55,425 |
| Nevada | 150 | .... | 150 | 150 |
| New Mexico | 264,400 | 5,700 | 270,100 | 270,085 |
| North Dakota | 35,850 | .... | 35,850 | 35,750 |
| Oklahoma | †544,100 | .... | †544,100 | †593,000 |
| Texas | 2,665,000 | 60,100 | 2,725,100 | 2,725,100 |
| Dist. 1 | 46,000 | 550 | 46,550 | 46,550 |
| Dist. 2 | 119,000 | 9,400 | 128,400 | 128,400 |
| Dist. 3 | 381,000 | 29,000 | 410,000 | 410,000 |
| Dist. 4 | 197,000 | 6,400 | 203,400 | 203,400 |
| Dist. 5 | 32,000 | 550 | 32,500 | 32,550 |
| Dist. 6 | 117,000 | 7,000 | 124,000 | 124,000 |
| East Texas field | 161,000 | .... | 161,000 | 161,000 |
| Dist. 7-B | 146,000 | 150 | 146,150 | 146,150 |
| Dist. 7-C | 147,000 | 4,075 | 151,075 | 151,075 |
| Dist. 8 | 1,017,000 | 1,650 | 1,018,650 | 1,018,650 |
| Dist. 9 | 198,000 | 725 | 198,725 | 198,725 |
| Dist. 10 | 104,000 | 600 | 104,600 | 104,600 |
| Utah | 18,225 | .... | 18,225 | 12,825 |
| Wyoming | 300,150 | .... | 300,150 | 310,000 |
| Others | ‡200 | .... | ‡200 | ‡200 |
| Total U. S. | 6,674,450 | 160,425 | **6,834,875** | 6,926,335 |
| Change from prev. week, down | | | **91,460** | .... |
| Canada | †529,800 | .... | †529,800 | †527,800 |

Total U. S. production—Jan. 1-Feb. 1 ..... 220,291,340 bbl.

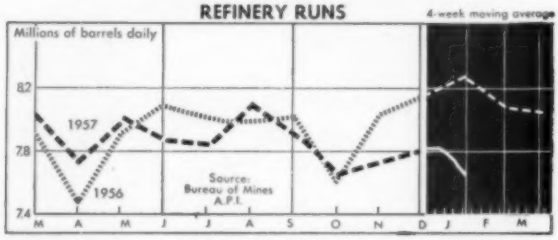
Same period last year (crude plus cond.) ..... *239,476,467 bbl.

*Includes 4,714,200 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

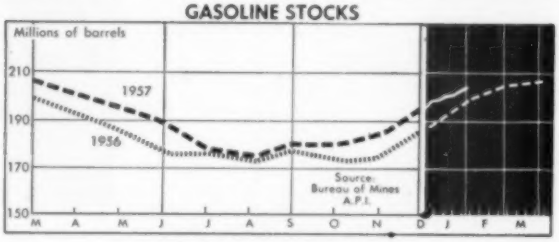
CRUDE-OIL STOCKS



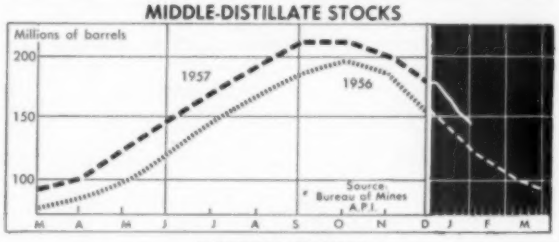

REFINERY RUNS



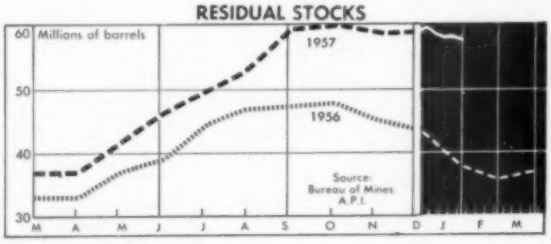

GASOLINE STOCKS




MIDDLE-DISTILLATE STOCKS




RESIDUAL STOCKS




**CRUDE-OIL STOCKS BY STATES OF ORIGIN***
(Thousands of barrels)

| | 1-25-58 | 1-18-58 | 1-26-57 |
|---|---|---|---|
| Pennsylvania Grade | 2,905 | 2,888 | 2,335 |
| Other Appalachian | 1,631 | 1,647 | 2,250 |
| Illinois, Indiana, and Michigan | 11,038 | 10,932 | 10,888 |
| Nebraska and North Dakota | 2,754 | 2,464 | 1,965 |
| Kansas | 10,032 | 9,929 | 9,633 |
| Oklahoma | 19,025 | 19,559 | 21,529 |
| Arkansas | 2,519 | 2,764 | 2,821 |
| Louisiana | 19,465 | 19,610 | 18,647 |
| North | 3,035 | 3,129 | 2,837 |
| South | 16,430 | 16,481 | 15,810 |
| Mississippi, Ala., and Fla. | 2,429 | 2,501 | 2,807 |
| New Mexico | 9,162 | 9,421 | 7,815 |
| Texas | 121,914 | 121,071 | 113,403 |
| East Texas | 9,074 | 8,677 | 8,885 |
| West Texas | 53,987 | 53,233 | 53,565 |
| Texas Gulf | 24,987 | 25,229 | 21,200 |
| Other Texas | 33,866 | 33,932 | 29,753 |
| Wyoming | 13,812 | 13,936 | 16,036 |
| Other Rocky Mountain | 6,494 | 6,836 | 5,878 |
| California | 37,074 | 36,888 | 27,396 |
| Foreign | †16,628 | 16,619 | 10,787 |
| Total | 276,882 | 277,065 | 254,190 |

*Bureau of Mines. †Includes 5,459,000 bbl. in California.

**API REFINERY REPORT—JANUARY 31, 1958**
(Thousands of barrels)

| District— | Daily avg. runs | Daily average production— Gaso.* | Kero. | Dist. | Resid. | Stocks‡— Gaso.† | Kero. | Dist. | Resid. | Bureau of Mines, January 1957— Daily avg. runs | Daily average production— Gaso.* | Kero. | Dist. | Resid. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 1,109 | 500.9 | 26.0 | 332.1 | 185.3 | 42,475 | 10,066 | 46,769 | 11,789 | 1,214 | 505.7 | 39.9 | 370.5 | 244.6 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 97 | 42.4 | 4.7 | 23.3 | 8.0 | 5,201 | 565 | 2,464 | 632 | 103 | 40.6 | 6.3 | 24.0 | 9.5 |
| District 2 | 104 | 56.2 | 8.4 | 21.3 | 12.4 | 2.744 | 385 | 912 | 453 | 111 | 53.3 | 6.9 | 20.7 | 16.7 |
| Ind., Ill., Ky. | 1,366 | 695.9 | 81.0 | 306.6 | 178.3 | 35,923 | 5,053 | 16,426 | 4,980 | 1,463 | 740.7 | 70.4 | 345.0 | 220.4 |
| Minn., Wis., Dak. | 110 | 49.4 | 2.6 | 29.6 | 13.7 | 7,182 | 831 | 6,062 | 484 | 100 | 47.9 | 5.6 | 25.7 | 12.5 |
| Okla., Kans., Mo. | 738 | 425.3 | 23.3 | 194.0 | 38.2 | 19,299 | 872 | 9,570 | 1,251 | 714 | 395.7 | 16.6 | 184.8 | 41.5 |
| Inland Texas | 272 | 198.7 | 8.6 | 52.4 | 24.1 | 8,520 | 428 | 1,514 | 2,115 | 279 | 198.0 | 7.3 | 52.0 | 27.0 |
| Texas Gulf Coast | 1,698 | 910.0 | 134.1 | 452.4 | 192.7 | 29,943 | 1,814 | 13,479 | 5,710 | 2,033 | 914.6 | 135.1 | 595.8 | 257.6 |
| La. Gulf Coast | 571 | 341.0 | 51.1 | 116.0 | 39.6 | 12,647 | 1,452 | 5,874 | 1,176 | 704 | 346.5 | 62.1 | 218.6 | 61.1 |
| N. La. and Ark. | 100 | 33.6 | 5.6 | 37.9 | 11.1 | 4,732 | 1,073 | 1,897 | 118 | 101 | 41.1 | 9.4 | 24.7 | 8.9 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 29 | 14.7 | 1.0 | 7.0 | 3.7 | 404 | 18 | 135 | 89 | 28 | 13.9 | 0.3 | 5.3 | 3.6 |
| Other Rocky Mt. | 262 | 123.4 | 6.0 | 63.4 | 34.6 | 6,896 | 310 | 2,718 | 909 | 286 | 137.2 | 2.4 | 66.6 | 41.0 |
| West Coast | 1,092 | 471.4 | 2.7 | 155.9 | 329.3 | 28,593 | 312 | 15,301 | 27,796 | 1,138 | 504.0 | 4.9 | 184.4 | 377.9 |
| Jan. 31, 1958 | 7,548 | 3,862.9 | 355.1 | 1,791.9 | 1,071.0 | 204,559 | 23,179 | 123,121 | 57,502 | 8,274 | 3,939.2 | 367.2 | 2,118.1 | 1,322.3 |
| Jan. 24, 1958 | 7,639 | 3,778.4 | 342.4 | 1,791.9 | 1,060.6 | 203,256 | 24,051 | 128,181 | 57,810 | ..... | ..... | ..... | ..... | ..... |
| Feb. 1, 1957 | 8,202 | 3,880.3 | 403.6 | 2,087.9 | 1,241.0 | 196,351 | 24,622 | 100,369 | 38,212 | ..... | ..... | ..... | ..... | ..... |

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

# Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

## REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

### GASOLINE*

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| Regular (89 octane) | 11.25-11.75 |
| Premium (98 octane) | 14.00-14.50 |
| **Gulf Coast (cargoes for coastwise or export movements):** | |
| ★ Regular (90 octane) | 10.00-10.50 |
| ★ Regular (92 octane) | 10.25-10.50 |
| ★ Premium (97 octane) | 11.75-12.00 |
| ★ Premium (98 octane) | 12.00-12.50 |
| **California (rack) (Los Angeles):** | |
| Regular (88 octane) | 12.2 |
| Premium (96 octane) | 14.5 |
| Premium (98 octane) | 15.0 |
| **Caribbean area (cargoes):** | |
| ★ Regular (87 octane) | 10.125 |
| ★ Premium (93 octane) | 11.00 |

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

### NATURAL GASOLINE*

| | |
|---|---|
| **Group 3:** | |
| Grade 26-70 | 4 5 |
| **Breckenridge:** | |
| Grade 26-70 | 4.0 |

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

### KEROSINE AND DISTILLATE

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| ★ Kerosine 42-44 | 9.50-9.75 |
| ★ Diesel oil (58 d.i. and above) | 9.125-9.50 |
| ★ Distillate No. 1 | 9.125-9.50 |
| ★ Distillate No. 2 | 8.50-8.75 |
| **Gulf Coast (cargoes):** | |
| ★ Kerosine 41-43 | 8.50-8.75 |
| ★ Distillate No. 2 | 8.25-8.50 |
| **New York Harbor (barges):** | |
| ★ Kerosine 41-43 | 10.35 |
| ★ Distillate No. 2 | 9.85 |
| ★ Diesel fuel, 48-52 d.i. | 10.25 |
| **Caribbean area (cargoes):** | |
| Distillate No. 2 | 8.75 |

### WAX (LB.)

| | |
|---|---|
| **Oklahoma (Group 3):** | |
| 132-135 A.m.p. (semi-refined) in tank cars | 6.50 |
| **New York (export):** | |
| 126-130 A.m.p. crude-scale (solid in bags or barrels) | 7.35 |

★Denotes change from previous week.

### RESIDUAL FUEL (BBL.)

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| Residual fuel (max. 1% S) | $1.25-1.40 |
| **Gulf Coast (cargoes):** | |
| ★ Bunker C fuel | $2.25-2.50 |
| **New York Harbor (barges):** | |
| Bunker C fuel | $2.75 |
| **Caribbean (cargoes):** | |
| Bunker C | $2.35 |
| **California (rack):** | |
| Bunker C fuel, Los Angeles | $2.65-2.80 |

### LUBRICATING OILS

| | |
|---|---|
| **Mid-Continent (Group 3):** | |
| 150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i. | 25.5 |
| 200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i. | 22.25 |
| **Pennsylvania Grade:** | |
| 145-155 vis. at 210, bright stock, 8 color, 25 p.t. | 27 |
| 200 vis. neutral (180° at 100°), 25 p.t. | 25 |

## CRUDE-OIL PRICES

### GRAVITY SCHEDULE

| | Signal Hill, Calif. | Mid-Cont.* | Gulf Coast Tex.† | West Tex.‡ N.M. | Wyo. (sour) (§) |
|---|---|---|---|---|---|
| 14-14.9 | $2.67 | .... | .... | .... | .... |
| 15-15.9 | 2.71 | .... | .... | .... | $1.81 |
| 16-16.9 | 2.74 | .... | .... | .... | 1.86 |
| 17-17.9 | 2.78 | .... | .... | .... | 1.91 |
| 18-18.9 | 2.82 | .... | .... | .... | 1.96 |
| 19-19.9 | 2.85 | .... | .... | .... | 2.01 |
| 20-20.9 | 2.89 | $2.75 | .... | $2.62 | 2.06 |
| 21-21.9 | 2.93 | 2.77 | .... | 2.64 | 2.11 |
| 22-22.9 | 2.97 | 2.79 | .... | 2.66 | 2.16 |
| 23-23.9 | 3.01 | 2.81 | $3.44 | 2.68 | 2.21 |
| 24-24.9 | 3.05 | 2.83 | 3.46 | 2.70 | 2.26 |
| 25-25.9 | 3.09 | 2.85 | 3.48 | 2.72 | 2.31 |
| 26-26.9 | 3.13 | 2.87 | 3.50 | 2.74 | 2.36 |
| 27-27.9 | 3.17 | 2.89 | 3.52 | 2.76 | 2.49 |
| 28-28.9 | 3.22 | 2.91 | 3.54 | 2.78 | 2.54 |
| 29-29.9 | 3.27 | 2.93 | 3.56 | 2.80 | 2.59 |
| 30-30.9 | 3.32 | 2.95 | .... | 2.82 | 2.63 |
| 31-31.9 | 3.38 | 2.97 | .... | 2.84 | 2.67 |
| 32-32.9 | 3.44 | 2.99 | .... | 2.86 | 2.71 |
| 33-33.9 | 3.50 | 3.01 | .... | 2.88 | 2.75 |
| 34-34.9 | 3.56 | 3.03 | .... | 2.90 | 2.79 |
| 35-35.9 | 3.61 | 3.05 | .... | 2.92 | 2.83 |
| 36-36.9 | 3.65 | 3.07 | .... | 2.94 | 2.87 |
| 37-37.9 | 3.68 | 3.09 | .... | 2.96 | 2.89 |
| 38-38.9 | .... | 3.11 | .... | 2.98 | 2.91 |
| 39-39.9 | .... | 3.13 | .... | 3.00 | 2.93 |
| 40 and up | .... | 3.15 | .... | 3.02 | 2.95 |

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Most buyers are posting Wyoming sour in two schedules, 15°-26.9° and 27°-40°.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

### FLAT PRICES

| | |
|---|---|
| **Louisiana:** | |
| Bienville (distillate) | $3.05 |
| Ville Platte | 3.45 |
| **Texas:** | |
| East Texas | 3.25 |
| Conroe | 3.53 |
| Van | 3.08 |
| **Pennsylvania Grade:** | |
| Bradford | 4.65 |
| Middle District | 4.47 |
| Southwest Pennsylvania | 4.18 |
| West Virginia | 4.00 |
| Buckeye Grade | 4.00 |
| Zanesville Grade | 3.04 |
| **Illinois Basin** | 3.00-3.05 |
| **Canada:** | |
| Leduc-Woodbend | 2.74 |
| Redwater (Alta.) | 2.63 |
| Smiley (Sask.) | 2.40 |
| Pembina | 2.61 |

### FOREIGN

| | |
|---|---|
| **Venezuela:** | |
| Cumarebo, 48°-49.9°, Tucupido | 3.75 |
| San Joaquin, 41°-41.9°, Puerto La Cruz | 3.34 |
| Oficina, 35°-35.9°, Puerto La Cruz | 3.05 |
| Tia Juana medium, 26.5°-26.9°, Amuay* | 2.55 |
| Quiriquire, 16.5°-16.9°, Caripito | 2.45 |
| Lagunillas heavy, flat, Amuay or Las Piedras* | 2.38 |
| Bachaquero, flat, Las Piedras* | 2.23 |

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

| | |
|---|---|
| **Middle East, Persian Gulf (cargoes, f.o.b. lifting port):** | |
| Arabian, 36.0°-36.9°, Ras Tanura | $2.12 |
| Iranian, 34.0°-34.9°, Bandar Masur | 2.04 |
| Iranian, 34.0°-34.9°, Abadan | 1.99 |
| Iraq, 35.0°-35.9°, Fao | 1.98 |
| Kuwait, 31.0°-31.9°, Mina-al-Ahmadi | 1.85 |
| Qatar, 41.0°-41.9°, Umm Said | 2.23 |
| **Middle East, E. Mediterranean:** | |
| ★ Arabian, 36.0°-36.9°, Sidon | 2.49-2.59 |
| ★ Iraq, 36.0°-36.9°, Tripoli, Banias | 2.49-2.59 |
| **Far East (cargoes, f.o.b. Lutong, Sarawak):** | |
| Seria Light, 37° | 2.75 |

### TANKER RATES PER LONG TON
(Latest reported spot fixtures)

| | |
|---|---|
| Gulf-U.S.N.H., clean (USMC—7.5%) | $2.64 |
| ★ Carib.-U.S.N.H., dirty (USMC—55.0%) | 1.22 |
| ★ Carib.-U.K., clean (Scale—27.5%) (23s. 7d.) | 3.30 |
| ★ P.G.-U.S.N.H., dirty (USMC—70.0%) | 3.81 |
| ★ Sidon-U.S.N.H., dirty (USMC—72.5%) | 2.15 |

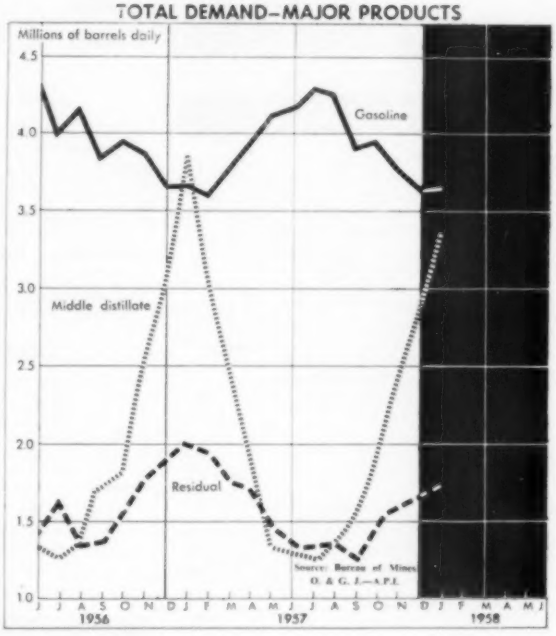
## SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

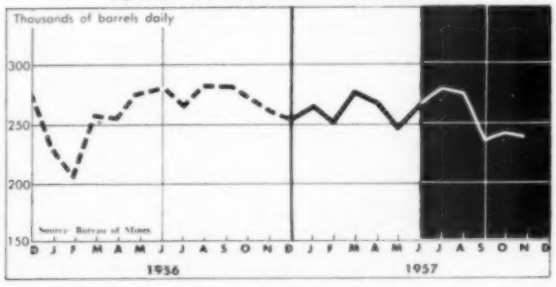
| | Total demand | Refinery production | Stocks end of period† |
|---|---|---|---|
| **GASOLINE** | | | |
| January 1958* | 3,660 | 3,840 | 204,560 |
| December 1957* | 3,655 | 3,935 | 196,925 |
| November 1957 | 3,705 | 3,864 | 187,141 |
| February 1957 | 3,597 | 3,789 | 205,270 |
| January 1957 | 3,655 | 3,939 | 197,702 |
| **KEROSINE** | | | |
| January 1958* | 540 | 360 | 23,180 |
| December 1957* | 465 | 345 | 28,600 |
| November 1957 | 384 | 324 | 23,696 |
| February 1957 | 467 | 353 | 21,013 |
| January 1957 | 613 | 367 | 24,019 |
| **DISTILLATE** | | | |
| January 1958* | 2,800 | 1,860 | 123,120 |
| December 1957* | 2,410 | 1,875 | 150,500 |
| November 1957 | 2,096 | 1,734 | 166,763 |
| February 1957 | 2,620 | 2,035 | 85,105 |
| January 1957 | 3,220 | 2,118 | 100,572 |
| **RESIDUAL** | | | |
| January 1958* | 1,720 | 1,070 | 57,500 |
| December 1957* | 1,650 | 1,110 | 59,400 |
| November 1957 | 1,581 | 1,069 | 59,622 |
| February 1957 | 1,946 | 1,269 | 36,201 |
| January 1957 | 2,102 | 1,322 | 38,403 |

*Preliminary. †Thousands of barrels.

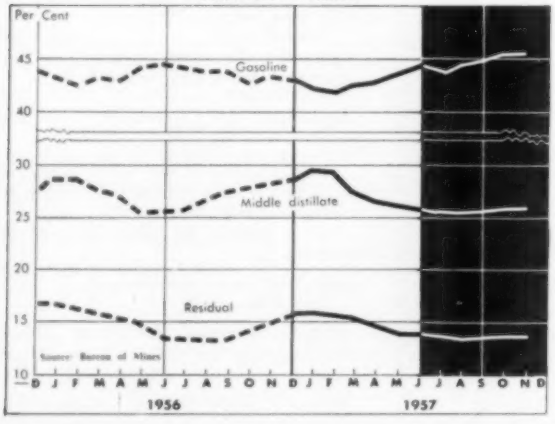
## TOTAL DEMAND–MAJOR PRODUCTS



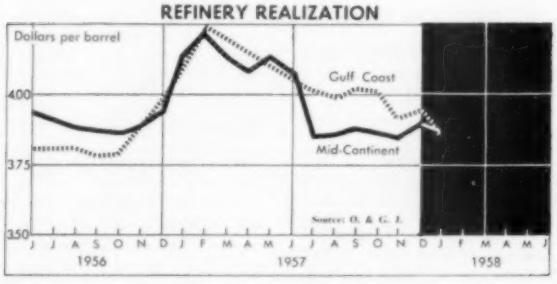

## TOTAL AVIATION GASOLINE DEMAND



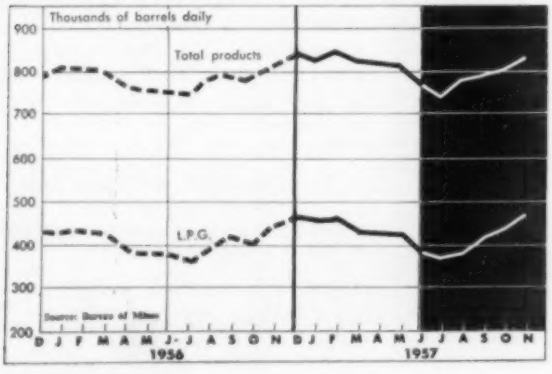

## REFINERY YIELDS




## REFINERY REALIZATION




## NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION




## REFINERY REALIZATION

| | Jan.* 1958 | Dec.* 1957 | Nov. 1957 | Jan. 1957 |
|---|---|---|---|---|
| Mid-Continent | $3.86 | $3.89 | $3.88 | $4.12 |
| Gulf Coast | 3.84 | 3.94 | 3.93 | 4.11 |

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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| | |
|---|---|
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**GRADUATE ENGINEERS**—Age to 50; All types—experienced or inexperienced—used in or related to the Petroleum Industry.

**TOOLPUSHERS**—Age to 40; high school graduates; 3-5 years experience.

**SUPERVISORS**—Age to 50; Operations—Processes—Crafts; 5 years SUPERVISORY EXPERIENCE; high school graduate.

**YOUR INQUIRY COMPLETELY CONFIDENTIAL**

Send education and employment resume to—

**LOVELESS PERSONNEL SERVICE**

616 S. Main • Tulsa, Oklahoma • LU 4-3601

## HELP WANTED

SALES ENGINEER by major tubular manufacturer for southwest. Field experience desired but not required. Salary dependent on background. Car and expenses and other substantial benefits. Forward resume and salary requirements. Replies held in confidence. Interviews arranged for qualified applicants. Our employees are aware of this ad. Box K-531, The Oil and Gas Journal, Tulsa, Oklahoma.

**LABORATORY MANAGER**
**CORE ANALYSIS**

Excellent opportunity for graduate engineer. Position covers complete scope of analysis techniques, interpretation of results to oil operators and supervision of personnel. Please furnish resume and salary requirements. Write **DARREL W. SMITH CO.**, Box 1105, Midland, Texas. Attn.: L. W. Smith.

### SOLVENTS SALESMAN

Large, independent oil company has opening for a solvents salesman. Age 30 to 45. Southern territory of company well established in solvents field. Compensation includes saving and retirement plans. Application must give salary requirements and resume of experience.

**Box K-543, The Oil and Gas Journal, Tulsa, Oklahoma.**

### HEAT EXCHANGER RATING ENGINEERS

Graduate engineers with 2 to 3 years of Shell-and-tube heat exchanger rating experience. Excellent opportunity with well established, growing company. Submit resume and salary requirements. All inquiries kept confidential, and interviews will be arranged.

**REPLY TO E. D. ANDERSON**
**WESTERN SUPPLY COMPANY**
**P. O. Box 1888—Tulsa, Okla.**

### Sales Representatives Wanted

Experienced Sales Representatives wanted to sell Metering and Testing Equipment on Commission Basis in following Territories: (1) North Texas, (2) Texas Panhandle, (3) Four Corners Area, (4) Williston Basin, (5) Illinois (Tri-State Area, (6) Rocky Mountain Area, (7) Mississippi and Alabama, (8) Canada, (9) Mexico, 10) Colombia, S. A. These Territories available on exclusive protected Contract Basis to qualified experienced men. Please give details concerning sales experience, lines handled, and personal data in first reply.

**OIL METERING AND PROCESSING EQUIPMENT CORPORATION**
**P. O. Box 10277, Houston 18, Texas**

## SITUATIONS WANTED

LEASE-LANDMAN — Major company 12 years. Desires part time work Texas Gulf Coast & Louisiana. Box K-519, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 16 years experience—reservoir, reserves, evaluation, economics, development, operations—administrative and staff. References and resume. Box K-526, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: young, married, ten years experience, principally Mississippi and South Louisiana; successful oil finder, administrator. Desire position with small company or substantial independent, location immaterial. Box K-532, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE BROKER, 16 years broker and major company experience all phases land and drilling deals. Desires permanent opportunity with independent oil company in Rocky Mountain area. P. O. Box 2584, Salt Lake City, Utah.

DENVER INDEPENDENT OIL Accountant, 28, BSBA. Experience in production, drilling and exploration. Desire supervisory position with aggressive Denver independent. Executive potential. Present employer reference. P. O. Box 2891, Dallas 21, Texas.

## SITUATIONS WANTED

GEOLOGIST seven years subsurface experience. Wishes to relocate. Prefer Canada or Rocky Mountains. Box K-544, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED Petroleum Engineer, 9 years varied experience in Production, workovers, secondary recovery, and some drilling and reservoir. Interested in responsible supervisory position. Box K-540, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER. Twelve years experience major companies in design, construction and operation of gas processing plants, including pipeline facilities. Supervisory experience. Desire position in Texas with medium size company, independent or contractor. Box K-539, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE ENGINEER available for South American assignment. Present employment with major oil company in Marketing Department. Experience includes Naval Architecture and administration. Interest not limited to S. A. Box K-542, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 30, Master's, 5½ years major, 1 stratigraphic, 4½ subsurface in Texas, will relocate domestic, consider foreign. Box K-459, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST - GEOPHYSICIST, eighteen years experience, majority in geophysics, U. S. and Canada. Available immediately, managerial capacity or geophysical coordinator, prefer producing company, consider contractor, domestic or foreign. Richard H. Benish, 1273 Ash Street, Denver, Colorado.

OIL EXECUTIVE, Comptroller, Treasurer, Director, Production, Drilling, Organization, Promotion. Available soon. Box K-497, The Oil and Gas Journal, Tulsa, Oklahoma.

**THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal, Tulsa, Oklahoma.**

**GEOLOGIST**

Young (37), aggressive, explorationist seeks more responsible position with large or small independent. Broad background in subsurface and geophysical coordination. Experience in Texas, California, Wyoming, Kentucky, and Alaska. B.A., M.S. If your company needs someone to originate, direct, and/or pursue a sound program of oil exploration, I am your man.

**Box K-534, The Oil and Gas Journal, Tulsa, Oklahoma.**

### WANTED IN CANADA

a line of pump liners, rods, valves & seats. Now representing Pioneer Specialties (head only) and Foster Cathead. Nine men in four different locations—Edmonton & Calgary, Alberta, Esteven, Sask., and Dawson Creek, B. C.

**LEIDECKER TOOL CO. LTD.**
**6825—104 ST.**
**EDMONTON, ALBERTA**

## BUSINESS OPPORTUNITIES

### SALES ENGINEER

Chemical Engineer, 34, 12 years experience in sales of process and mechanical equipment, engineering and construction sales, economic studies and contract negotiations purchase and sale of natural gas and products. Experienced in supervision of district sales office and agents for selling to all phases oil, gas and chemical industries in Southwest. Will relocate and travel. Desire connection with expanding company and opportunity for sales management. Western Canada of interest.

**Box K-521,**
**The Oil and Gas Journal,**
**Tulsa, Oklahoma.**

## SITUATIONS WANTED

EFFICIENT OPERATOR, 41, 14 years experience, Crude Unit, Vis Breaker, Vacuum, T.C.C., Alky., Gas Plant, Cat Poly & Catalytic Reforming. Desires operating position. Would consider start up work. Box K-513, The Oil and Gas ournal, Tulsa, Oklahoma.

## ROYALTIES

HAVE MARKET for large production and producing royalties. Box 947, Ada, Oklahoma.

OFFERING CHOICE ROYALTIES. You can now make very small investments on income Royalties or those ahead of drilling. A. S. Berry, 520 Wright Bldg., Tulsa, Okla.

WE WANT producing royalties, producing oil & gas properties, also farmouts gas acreage. Ben H. Williams — Clarendon, Texas.

HAVE EXCELLENT market for producing royalty. Prefer a developed or partially developed field. R. E. Clement, Box 65, Norman, Oklahoma.

## LEASES

FOR SALE BY OWNER—160 acre oil and gas lease, SW ¼ of Section 1039, Block 43, H&TC RR Company Survey, Lipscomb County, Texas. $10.00 per acre. Loicano and Lee, 702 Continental Life Bldg., Fort Worth 2, Texas.

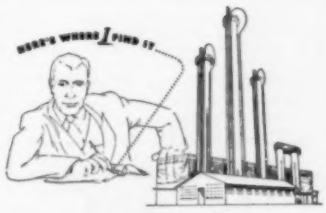
## BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

## STRIP LOG CABINETS

MORE LOGS ARE FILED in Kraftbilt Strip Log Cabinets than all others combined. Loaded drawers glide smoothly on roller bearings. Three drawers per section, add sections as needed. Bilt to last a lifetime! Send for Catalog 58-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Okla.

### *Can You Help This Man?*




**It's a good bet that you can!**

Actually he's a lot of men. Men that have jobs to fill or want a new position; equipment to buy or sell; production, acreage, leases, or real estate to sell or buy; or a business opportunity. He may be looking for your services, maps, or field records.

*Why Not Tell Him You Have*
*What He Wants With*
**A JOURNAL CLASSIFIED**

The cost is reasonable:—26¢ per word or $18. per Col. in. Minimum $5. for word ads, 1 in. for Display. 10% reduction for three consecutive insertions of the same copy. (This ad is 1 col. wide and 5 in. deep.)

*For assistance on classified ads, write*

**THE OIL AND GAS JOURNAL**
**P. O. Box 1260 — Tulsa, Okla.**

**REAL ESTATE**

FOR SALE—1 acre interest, Lincoln County, Oklahoma. 5-10 yield monthly. Name price. Joseph Moliterno, 25-85 36th Street, Astoria 3, L. I., New York.

**BUSINESS OPPORTUNITIES**

SELL YOUR GAS—Turn waste into cash. We will furnish compressors, gathering system and know-how if you have marketable gas. Knight Mfg. Co., Box 3265, Tulsa, TEmple 8-3304.

**LEASE AND DRILLING BLOCKS**

FOR SALE BY OWNER working interest and operational management in leases and 19 wells producing from 2500 foot zone; also interests in other properties. Box K-541, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND AUCTION
Located on Hi-way 15 at Junction of Hi-way 270 and 183. West of City Limits of Woodward, Oklahoma. 20 acres, with one-half minerals. Date February 13th, 1958, 2:00 P. M. Col. Albert Williams—Auctioneer, Baker Hotel, Woodward, Oklahoma.

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

**PRODUCTION FOR SALE**

PRODUCTION FOR SALE—800 acres in two blocks, Washington county, Oklahoma. 18 Bartlesville wells, 30 bbls. production. Have core analysis. Cash deal. Phone 422, Caney, Kansas, after 6 p. m.

3 WELLS, 300 ACRES, consistent average 35 bbls. daily, Richardson County, Nebr., half working int. $14,000. Box K-528, The Oil and Gas Journal, Tulsa, Oklahoma.

**PRODUCTION WANTED**

WANTED: Oil properties, 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1160, Tulsa, Okla.

DESPITE "tight money," principals will buy any size oil-gas production reasonably priced. Quick action. Box 231, Scarsdale, N. Y.

PRODUCTION WANTED: Our client desires to purchase lease producing 50 to 250 barrels of oil per day above 5000 feet in Kansas, Oklahoma, Texas, New Mexico, Colorado, Nebraska or Wyoming. Please forward price, description and details to Oil Property Management Company, Box 856, Casper, Wyoming.

**$$ ONE MILLION DOLLAR$$$**

**AVAILABLE FOR PURCHASE OF PRODUCTION,**

**OIL LEASES, PROPERTIES, ROYALTIES, OR WORKING INTERESTS.**

**Also interested in developing financing and drilling suitable water flooding areas.**

**MID-STATES STEEL & IRON CO.**

4242 Dempster

SKOKIE, ILLINOIS

**LEGAL**

U. S. DEPARTMENT OF THE INTERIOR. Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 118.65 acres of land within the known geologic structure of the Carterville, Elm Grove and Lodessa Fields in Bossier and Caddo Parishes, Louisiana, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P.M., EST, February 19, 1958, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids and bid forms may be obtained from the Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C., H. K. Scholl, Manager.


# EQUIPMENT MEN . . . in the news

## Security Names Winter as Ass't. Sales Manager . .

P. L. WINTER

for the Eastern Hemisphere. Peter L. Winter will be based in London and will be responsible for expanded distribution of rock bits and other drilling tools to oil-active areas in the Eastern Hemisphere, according to A. M. Birnie, executive vice president of Security Engineering Division.

Since 1946 Winter has served in various divisions of the oil industry, with oil companies, drilling contractors and equipment suppliers in the United Kingdom, Kuwait, Trinidad and Canada.

## Waukesha Sales Appointed Climax Distributor . .

which enables Waukesha to offer engines for services requiring power capacities intermediate between the ratings of many of its existing models. As a result the company will have complete coverage in a power range up to 1,200 hp.

Waukesha Sales & Service, Inc., is a large distributor of oil field engines and is exclusive distributor in Texas, Louisiana and New Mexico for Waukesha Motor Co. of Waukesha, Wis. The latter company recently purchased the complete plant and assets of Climax Engine Manufacturing Co., Clinton, Iowa.

Waukesha Sales is headed by Louis M. Pearce, Jr., president.

## Westinghouse to Build Venezuelan Power Plant . .

for Compania Shell de Venezuela. This gas turbine power station with completely automatic remote controls will power a new $85-million oil storage and tanker-loading facility on Lake Maracaibo.

The 10,000-kw. station will be constructed and equipped by Westinghouse Electric International Co. at a cost of over $3 million. Capacity of the new installation will allow handling initially 700,000 bbl. daily and eventually well over one million barrels per day.

Use of automatic remote controls will permit one man to run the turbine and the distribution system from a single point. To assure continuous operation, the two 5,000-kw. gas turbines have been designed to switch to diesel fuel should there be a failure in the gas supply.

The station will begin operation in October. Westinghouse is building the turbines at its Lester, Pa., plant. The generators, supervisory relays and telemetering control equipment will be manufactured at East Pittsburgh, Pa.

## George Engine Co., Inc., Names Colby and Foy . .

as executive vice president-general manager and sales manager, respectively.

H. F. Colby had previously been

H. F. COLBY

HARRY FOY

sales manager. Foy succeeds Colby and brings to his new post extensive experience in the engine field.

George Engine, Harvey, La., is General Motors diesel engine distributor and a leader in marine diesel engine sales.

## Brown Well Service to Make $H_2$Oil Equipment . .

at Tulsa under the same trademark. $H_2$Oil Engineering Co. becomes the $H_2$Oil Equipment Division of Brown Well Service of West Texas.

H. C. Brown will continue as president of Brown Well Service. and Russell D. May will become general manager of the $H_2$Oil division. A. J. Hale will become general sales manager. Headquarters are in Tulsa with district sales and service offices in the Southwest.

Brown Well Service was organized in 1946. Its main plant is at Odessa, Tex., with a second one at Hobbs, N. M.

The recent agreement will enlarge the manufacturing facilities of $H_2$Oil and permit the division to expand its engineerng services to more fully cover the fields of lease automation and secondary recovery operations, as well as the emulsion treatment of oil.

## Orbit Valve Co. Adds A. J. Burk to Sales Force . .

A. J. BURK

as representative in Wichita Falls, Tex.

David M. Alkire has been transferred from Wichita Falls to Casper, Wyo., and Owen H. Walker from Houston to New Orleans, according to L. E. Wallace, general sales manager for Orbit Valve.

## Allis-Chalmers Opens Abilene Sales Office . .

in the First National Bank Building with James C. Barnett as resident representative.

Barnett had been a sales representative in the Allis-Chalmers Manufacturing Co.'s Dallas district office. He joined the firm in 1951 and was assigned to Boston Works the following year as an assistant engineer. In 1954 he became assistant to the production engineer at Boston Works and a year later plant engineer there.

## New Magazine Features Southern Mill Home . .

in a portfolio of homes which will be offered during 1958 in the prebuilt homes market. The Housing Annual of 1958, a magazine first appearing in January, features 1 of 12 basic models in the Southern Mill & Manufacturing Co.'s 1958 line, the "El Rancho."

According to A. R. Tandy, president of Southern Mill, a cross-section of new models, articles of interest to home buyers and owners, and a buyer's guide to home manufacturers are included in the new magazine.

## Schlumberger Appoints . .

six to new assignments. W. A. Eickmeyer, for many years manager of the Abilene, Tex., district for Schlumberger Well Surveying Corp., is now division sales manager in Dallas. R. G. Tefft, formerly district manager at Andrews, Tex., replaces Eickmeyer as manager at Abilene. New manager at Andrews is G. F. Horst.

L. F. Holdman is the new sales engineer at Mount Vernon, Ill. Burton Delleney, formerly division sales manager in Dallas, has been transferred to the patent department in the Houston headquarters. V. J. Davis has been promoted to sales engineer at Gainesville, Tex. Davis formerly was field engineer for that area.

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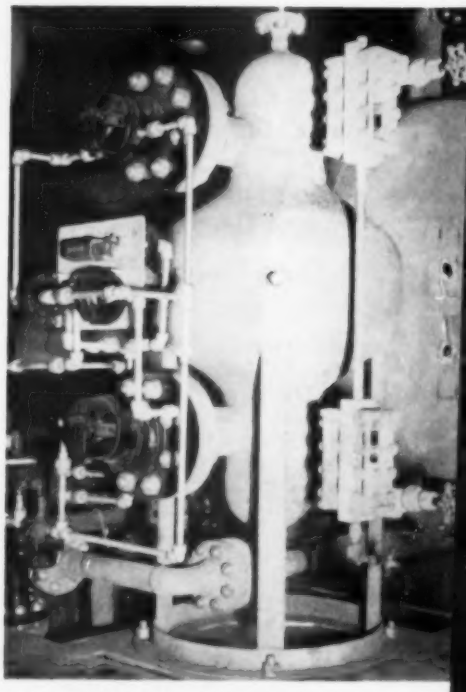
# NATIONAL SERAPHIN NECK FLUID METER

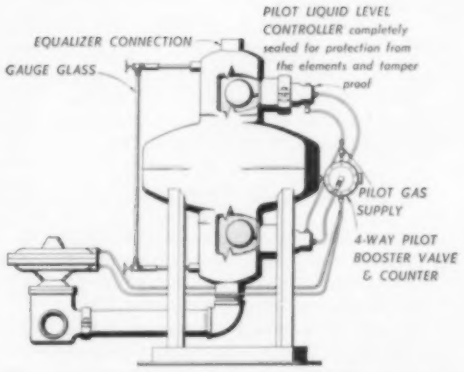
**For accurate measurement of production from individual wells under a common royalty.**

National Seraphin Neck Fluid Meter installation in Southern Oklahoma.



1200 PSI WP National Seraphin Neck Fluid Meter on offshore platform production unit — Louisiana.

1. Reduced liquid surface area holds percentage of metering error to minimum.
2. Greater accuracy provided through two weather-proof, tamper-proof, sensitive liquid level controls.
3. Control booster relay insures fast, positive liquid valve action.
4. Three-way metering valve, readily installed or removed, constructed of materials to give maximum service and positive shutoff.
5. Corrosion resistant trim on valves and controls.
6. All components rust and weather-proofed.
7. Accurate within the limits prescribed by producer, royalty owner and regulatory body for measuring oil to be commingled.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GAUGE GLASS
PILOT LIQUID LEVEL CONTROLLER completely sealed for protection from the elements and tamper proof
PILOT GAS SUPPLY
4-WAY PILOT BOOSTER VALVE & COUNTER

NATIONAL SERAPHIN NECK FLUID METER

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## NATIONAL TANK COMPANY

TULSA, OKLAHOMA

# Good equipment

## .....PLUS A GOOD CREW

## MAKES Satisfied CUSTOMERS

**Satisfied customers are the greatest asset a well servicing contractor can have—particularly when times are rough and many yards are full of units. Good equipment, plus good crews, is one of the most important ingredients in gaining satisfied and repeat customers.**

**Franks pole mast units have a high preference among oil companies as units they like to have servicing their wells. Frank Cruisers are noted for simplicity, convenience, and rugged dependability.**

**They inspire crews to work fast, safely, and get a satisfactory job done for your customers.**

**Franks Cruisers obtainable in models 2,500 to 12,000 ft. Single or double drum, single or double pole mast.**

There's a Franks model best fitted for your individual work. Franks representatives will be happy to discuss this with you. Or write for a Franks catalog.

WELL SERVICING AND DRILLING UNITS

FRANKS

DIVISION OF

CABOT

PAMPA, TEXAS

Pioneered and perfected by Hughes — Tri-Cone rock bits set the standard of performance the world over. Back of each Tri-Cone bit is the industry's greatest rock bit experience . . . plus a half century of laboratory and field research. Wherever you drill, Hughes bits — either regular or Jet — are available in the sizes and types best suited to your particular drilling requirements. And of this you can be sure — the bits you get will incorporate the very latest in rock bit improvements!

**HUGHES TOOL COMPANY**

✻ HUGHES OWV–THE VERSATILE BIT – DRILLS EITHER MEDIUM SOFT OR MEDIUM HARD FORMATIONS